

Working File Folder - NSR Permit

Company Name: *Burlington Resources Oil & Gas*
County: *Law Lake* Company LP
Account: *NA* Permit No: *108166*
N: *105698112* Filing Date: *3/19/13*

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PERMITS

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Bryan W. Shaw, Ph.D., *Chairman*
Carlos Rubinstein, *Commissioner*
Toby Baker, *Commissioner*
Zak Covar, *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

March 19, 2013

MR RANDY BLACK
MANAGER OF PRODUCTION OPERATIONS GCBU
BURLINGTON RESOURCES OIL & GAS COMPANY LP
600 N DAIRY ASHFORD RD WESTLAKE 3, 15012
HOUSTON TX 77079-

Standard Permit Registration Number:	108166	Renewal Date:	March 19, 2023
Location:	From Whitsett go NE on FM 99 4.9 mi continue straight on FM 1091 7.7 mi turn L on FM 882 go 4.3 mi turn R on CR 246 go 1.3 mi lease rd will be on L follow lease rd 1.0 mi to site entrance on L		
City/County:	Whitsett, Live Oak County		
Project Description/Unit:	Sugarkane CTB - Baker Dehy Unit		
Regulated Entity Number:	RN105698112		
Customer Reference Number:	CN602989436		
New or Existing Site:	Existing		
Affected Permit (if applicable):	PBR 87632		
Standard Permit Type:	Oil and Gas Production Facilities		

Burlington Resources Oil & Gas Company LP has registered the emissions associated with the Sugarkane CTB - Baker Dehy Unit under the standard permit listed above as authorized by the Commissioners pursuant to Title 30 Texas Administrative Code § 116.602 (30 TAC § 116.602, effective 2/27/2011). Per your request, upon issuance of this Standard Permit, PBR 87632 will be voided. Emissions are listed on the attached table. For rule information see www.tceq.texas.gov/permitting/air/nav/standard.html. Planned MSS emissions for engine starter vents, engine blowdowns and VRU downtime have been reviewed. These authorized MSS emissions are included on the emissions table. No other planned MSS emissions will be authorized under this registration. The company is also reminded that these facilities may be subject to and must comply with other state and federal air quality requirements. In addition, under the applicability section for all Standard Permits, § 116.610(a)(2) states that "Construction or operation of the project must be commenced prior to the effective date of a revision to this subchapter."

If you have questions, please contact Ms. Sally Bittick at (512) 239-5226. This action is taken under authority delegated by the Executive Director of the TCEQ.

Sincerely,

A handwritten signature in black ink, appearing to read "Anne M. Inman".

Anne M. Inman, P.E., Manager
Rule Registrations Section
Air Permits Division
Texas Commission on Environmental Quality
cc: Air Section Manager, Region 14 - Corpus Christi

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CENTRAL FILE ROOM

Project Number: 190124

Standard Permit Maximum Emission Rates Table
Permit Number 108166

The facilities and emissions included in this table have been represented and reviewed as the maximum emissions authorized by this standard permit registration.

ESTIMATED EMISSIONS																
EPN / Emission Source	VOC		NOx		CO		PM _{10&2.5}		SO _x		H ₂ S		HCHO		Benzene	
	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Normal Operations																
COMP-01 / Compressor Engine 1	1.48	6.48	2.95	12.92	4.43	19.40	0.05	0.22	0.01	0.04			0.27	1.18	0.01	0.04
COMP-02 / Compressor Engine 2	1.39	6.09	2.78	12.18	4.17	18.26	0.05	0.22	0.01	0.04			0.58	2.54	0.01	0.03
FUG / Site Fugitives	2.00	8.79									<0.01	<0.01			0.02	0.09
REB-1 / Glycol Reboiler 1	<0.01	0.01	0.05	0.22	0.04	0.18	<0.01	0.02	<0.01	<0.01			<0.01	<0.01	<0.01	<0.01
REB-1/DEHY-SV / Glycol Delay Still Vent	0.78	3.41									0.01	0.05			0.04	0.17
FL-3/TK-19 / Condensate Storage Tank (Baker)	1.47	5.15									<0.01	<0.01			0.01	0.01
FL-3/TK-20 / Produced Water Storage Tank (Baker)	0.04	0.17									<0.01	<0.01			<0.01	<0.01
TK-AF / Antifreeze Liquid Storage	0.50	0.01														
TK-10 / Lub Oil Liquid Storage	<0.01	<0.01														
TK-SCAV / H ₂ S Scavenger Liquid Storage	<0.01	<0.01														
VRU/TRUCK1 / Condensate and Slop Tank Truck Loading (Sugarkane)	0.63	0.47													<0.01	<0.01
VRU/TRUCK2 / Produced Water Tank Truck Loading (Sugarkane)	0.01	<0.01													<0.01	<0.01
FL-3/TRUCK3 / Condensate Tank Truck Loading (Baker)	1.58	0.72													0.01	<0.01
FL-3/TRUCK4 / Produced Water Tank Truck Loading (Baker)	0.02	<0.01													<0.01	<0.01
FL-1 / Flare Combustion (assist and pilot)	0.01	0.04	0.22	0.97	0.45	1.97	<0.01	<0.01	0.03	0.13	<0.01	<0.01			<0.01	<0.01
FL-2 / Flare Combustion (assist and pilot)	0.01	0.04	0.22	0.97	0.45	1.97	<0.01	<0.01	0.03	0.13	<0.01	<0.01			<0.01	<0.01
FL-3 / Flare 3 (Baker waste gas, assist and pilot)	0.01	0.04	0.81	2.34	1.62	4.70	<0.01	<0.01	0.04	0.15	<0.01	<0.01			<0.01	<0.01

Scheduled Maintenance, Startup and Shutdown Events															
COMP-01-SV / Compressor Engine 1 Starter Vent	16.88	0.44									0.02	<0.01		0.07	<0.01
FL-1-SMSS/COMP-01-BD / Compressor Engine 1 Blowdown	0.26	0.01									<0.01	<0.01		<0.01	<0.01
COMP-02-SV / Compressor Engine 2 Starter Vent	16.88	0.44									0.02	0.02		0.07	<0.01
FL-1-SMSS/COMP-02-BD / Compressor Engine 2 Blowdown	0.24	0.01									<0.01	<0.01		<0.01	<0.01
FL-2-SMSS /TK-01 thru TK-08 / Condensate Tanks at Sugarkane (during VRU downtime)	2.14	1.10									<0.01	<0.01		0.01	<0.01
FL-02-SMSS/TK-09 / Slop Tank at Sugarkane (during VRU downtime)	0.18	0.05												<0.01	<0.01
FL-2-SMSS/TK-10 thru TK-18 / Produced Water Tank at Sugarkane (during VRU downtime)	0.08	0.03									<0.01	<0.01		<0.01	<0.01
FL-2-SMSS/TRUCK1 / Condensate and Slop Tank Truck Loading at Sugarkane (during VRU downtime)	1.58	0.09												0.01	<0.01
FL-2-SMSS/TRUCK2 / Produced Water Tank Truck Loading at Sugarkane (during VRU downtime)	0.02	<0.01												<0.01	<0.01
FL-1-SMSS / Flare 1 (engine blowdown waste gas)			0.24	0.01	0.48	0.01	<0.01	<0.01	0.04	<0.01					
FL-2-SMSS / Flare 2 (tanks waste gas during VRU downtime)			0.80	0.30	1.59	0.58	<0.01	<0.01	0.04	0.02					
TOTAL EMISSIONS (TPY):		33.60		29.91		47.07		0.46		0.52		0.08		3.72	0.35
MAXIMUM OPERATING SCHEDULE:															
			Hours/Day		Days/Week		Weeks/Year		Hours/Year						
			24		7		52		8760						

VOC - volatile organic compounds
 NO_x - total oxides of nitrogen
 CO - carbon monoxide
 PM₁₀ - particulate matter equal to or less than 10 microns in size
 PM_{2.5} - particulate matter equal to or less than 2.5 microns in size
 SO₂ - sulfur dioxide

**Fugitive emissions are an estimate only and should not be considered as a maximum allowable

**TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR
OIL AND GAS HANDLING AND PRODUCTION FACILITIES**

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

GENERAL INFORMATION			
Regulated Entity No.:	RN105698112	Project Type:	Standard Permit Application
Customer Reference No.:	CN602989436	Date Received by TCEQ:	March 8, 2013
Account No.:	None	Date Received by Reviewer:	March 12, 2013
City/County:	Whitsett, Live Oak County	Physical Location:	From Whitsett go NE on FM 99 4.9 mi continue straight on FM 1091 7.7 mi turn L on FM 882 go 4.3 mi turn R on CR 246 go 1.3 mi lease rd will be on L follow lease rd 1.0 mi to site entrance on L

CONTACT INFORMATION					
Responsible Official/Primary Contact Name and Title:	Mr. Randy Black Manager Of Production Operations GCBU	Phone No.:	(832) 486-6508	Email:	randy.c.black@conocophillips.com
Technical Contact/Consultant Name and Title:	Mr. James Woodall Sr. Environmental Specialist	Fax No.:	(832) 486-6431		
		Phone No.:	(832) 486-6508	Email:	james.woodall@conocophillips.com
		Fax No.:	(832) 486-6431		

GENERAL RULES CHECK	YES	NO	COMMENTS
Is confidential information included in the application?		X	
Are there associated NSR or Title V permits at the site?		X	
Are there any registrations or permits that will be incorporated into this standard permit and voided upon issuance of this standard permit?	X		PBR 87632 will be voided upon issuance of this standard permit.
Is the application for renewal of an existing standard permit?		X	
Was the TCEQ Oil and Gas Emission Calculation Spreadsheet (or equivalent) included in the application?	X		
Was an impacts evaluation included in the application?	X		
Have all existing affected sources been considered in the scope?	X		
Were appropriate gas and liquid analyses included in the application?	X		
Site-specific gas and liquid analysis used? If representative analysis used provide justification.	X		Ethridge B1 – Low Pressure Separator (same formation) Laird B1 – High Pressure Separator (same formation)
Extended analysis, including benzene?	X		
Is the application certified?	X		

NONATTAINMENT AND PSD CHECK	YES	NO	COMMENTS
Is the site located in a nonattainment area?		X	
Is the project major or is the site major for nonattainment source levels?		N/A	
Is the projects potential to emit of VOC or NOx increasing above the applicable nonattainment major modification level?		N/A	
Is the project's potential to emit of VOC or NOx increasing above the nonattainment netting trigger?		N/A	
Does NOx Cap and Trade apply to this registration?		X	
Are emissions of any criteria pollutant increasing by 250 tpy at an unnamed source?		X	
Are emissions increasing above the PSD significance levels at an existing PSD major source site?		X	

MAINTENANCE, STARTUP, AND SHUTDOWN (MSS) EMISSIONS	YES	NO	COMMENTS
Are planned MSS emissions being registered with this authorization? <i>MSS emissions for all planned MSS activities must be registered for all oil and gas sites beginning January 5, 2014.</i>	X		

TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR OIL AND GAS HANDLING AND PRODUCTION FACILITIES

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

Are back-up control/recovery devices in place or do any alternate operations occur during any planned downtime of control/recovery devices, if necessary to meet the limitations of the standard permit?	X		
Have any emissions associated with all planned MSS events/activities been estimated and calculations provided?	X		
Are any engine/compressor start-ups associated with preventative system shutdown activities being authorized as part of normal operation?	X		
Prior to operation, alternative operating scenarios to divert gas or liquid streams are registered and certified with supporting documentation.	X		See note below.
Shutdowns will not result in emissions greater than 4.0 lb/hr.	X		
Start-up emissions are controlled to a minimum of 98% efficiency for VOC and H ₂ S.	X		

Note: This submittal includes emissions representation for alternate operational scenarios during maintenance event. The first scenario occurs when the VRU is down for maintenance and the flare is used as a back-up to control the emissions. Emissions related to the use of the flare to control emissions from the tanks are represented in this application as an SMSS event.

The second scenario occurs when the engines located at the site goes down for maintenance. Engine downtime would result in gas released from the compressors and in turn from the engines starter vent. All gas from the blowdowns is sent to the flare. The proposed site emissions include this maintenance event and the resulting combustion emissions.

OIL AND GAS FACILITY GENERAL INFORMATION			
Natural Gas Throughput (MMSCF/day):	15.0	H₂S Content of Inlet Gas:	150 ppmv
Oil Throughput (bbl/day):	---	Is the gas sweet or sour?	Sour
Condensate/ Oil Throughput (bbl/day):	Sugarkane = 500 Baker = 50	Is this an existing site?	Yes
Produced Water Throughput (bbl/day):	Sugarkane = 400 Baker = 200	Has the site been registered before?	Yes; PBR 87632 will be voided upon issuance of this permit.

DESCRIBE OVERALL PROCESS AT THE SITE
<p>On behalf of Burlington Resources Oil & Gas Company LP (Burlington), TITAN Engineering, Inc. (TITAN) is submitting this Oil and Gas Standard Permit (SP) Registration to the Texas Commission on Environmental Quality (TCEQ) for operations at Sugarkane CTB – Baker Dehy Unit (the Site) located near Whitsett in Live Oak County, TX. Upon authorization, this standard permit will authorize the following project:</p> <ul style="list-style-type: none"> • Two (2) compressor engines and associated starter vents and blowdowns; • One (1) glycol dehydration unit; • Nine (9) controlled atmospheric condensate storage tanks and associated loading; • Ten (10) controlled atmospheric produced water storage tank and associated loading; • One (1) controlled atmospheric slop storage tank and associated loading; • One (1) vapor recovery unit (VRU) control device; • Three (3) flare combustion control devices; and, • Piping and fugitive components. <p>TITAN and Burlington Resources believe that the Site and its associated air emissions meet the requirements of the TCEQ Non-Rule Standard Permit for Oil and Gas Handling and Production Facilities and 30 TAC §116.610, §116.611, §116.614, and §116.615. Please note that this site was permitted under a Permit by Rule (Permit number 87632). Please void the PBR registration for this Site upon approval of this Standard Permit submittal and note that with the inclusion of the Core Data form, a name change is requested for this RN. Additionally, this Site was previously permitted under CN601674351, for that reason a Core Data Form is being included in this registration to update the current customer and site information on the Central Registry (CR) to CN602989436.</p>

TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR OIL AND GAS HANDLING AND PRODUCTION FACILITIES

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

DESCRIBE PROJECT AND INVOLVED PROCESS

This Standard Permit registration is being submitted to authorize the co-location of two sites; Sugarkane CTB and Baker Dehy Unit. The aggregate site includes two (2) compressor engines and associated blowdown and starter vent events, one (1) glycol dehydration unit, nine (9) controlled atmospheric condensate storage tanks and associated loading, ten (10) controlled atmospheric produced water storage tanks and associated loading, one (1) controlled atmospheric slop storage tank and associated loading, one (1) vapor recovery unit (VRU) control device, three (3) flare combustion control devices, atmospheric chemical and lube oil storage tanks and piping and fugitive components (the Project) at the Sugarkane CTB – Baker Dehy Unit (the Site) located in Live Oak County, Texas.

Normal Operations

The aggregated Site will receive High Pressure (HP) gas, Low Pressure (LP) gas, and liquids (condensate and water) from eight (8) wells upstream. The gas off the HP and LP separators at the well sites will be metered and enter into their respective HP and LP headers and pipelines. LP gas will flow through the LP scrubber and be sent through compression (Facility Identification Numbers [FINs] COMP-01 and COMP-02) before entering the HP line. Fuel gas to the compressor is injected with H₂S scavenger liquid, which will treat the gas H₂S to 10 ppm or less. HP gas flows into the Site and comesling with the compressor discharge. The combined streams will then pass through a slug catcher and then be treated in a glycol contactor tower. The treated gas is then metered and sent to sales.

The tri-ethylene glycol used in the contactor tower is part of a regenerative system located at the Baker Dehy Unit pad. The rich glycol is first routed through a flash tank which collects off gas and is recompressed and recycled throughout the Site. The rich glycol is sent from the flash tank through the regeneration unit where it is heated (FIN REB-1) and the water is removed, then resent to the contactor tower as lean glycol. Emissions associated with the dehy regenerator still vent (FIN DEHY-SV) are controlled by the BTEX condenser and sent back to the reboiler for combustion with the fuel gas.

Pressurized liquids at the Baker site will be measured and sent to a condensate (FIN TK-19) and produced water tanks WIN TK-20). Emissions from both tanks are captured and controlled with a 98% efficiency by a flare combustion control device (FIN FL-3). The tanks are loaded out periodically by truck (FIN TRUCK3 and TRUCK4).

Pressurized liquids at the Sugarkane CTB will be measured and flow through a separator at the Site. Condensate is sent to and stored in condensate storage tanks (FINs TK-01 through TK-08). The water is routed to the produced water tank (FINs TK-10 through TK-18). The free liquids from the compressor scrubbers, fuel gas scrubbers, and slug catcher will go to the slop tank (FIN TK-09). Emissions from the condensate tanks (FINs TK-01 through TK-08), slop tank (FIN TK-09), and the produced water tank (FINs TK-10 through TK-18) will be routed to a VRU to be captured and controlled at a 100% efficiency. A second flare (FIN FL-2) serves as a back-up during VRU downtime. As demonstrated in the calculations, assist gas is sent to all flares to ensure that the waste gas stream can sustain combustion. Flash off gas from the water knockout separator is recirculated to the compressor, and some condensate continues to the condensate pipeline for sales.

All Sugarkane CTB tanks are loaded out periodically by truck (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the VRU and the flare during downtime. The Site will also emit emissions due to equipment component leaks (FIN FUG) and small storage tanks for engine operation (FINs TK-AF, TK-LO, and TK-SCAV).

Scheduled Maintenance Startup and Shutdown Events

In accordance with TCEQ guidance and the non-rule Oil & Gas Standard Permit, a representation of planned Maintenance, Startup and Shutdown events are included in this Standard Permit registration in addition to the normal operating scenario.

It is conservatively planned that the VRU will be down for maintenance 8% of the year. During this time, any emissions from the liquids going to the storage tanks (FINs TK-01 through TK-18) and being loaded out via truck (FINs TRUCK1 and TRUCK2) would be controlled by the flare (FIN FL-2-SMSS).

Additionally, during engine operational adjustments, the volume of gas in the compressor units will blow down, resulting in emissions. This blowdown event (FINs COMP-01-BD and COMP-02-BD) are captured and routed to the flare (FIN FL-1-SMSS) and emissions are controlled at a 98% capture and combustion efficiency. As this engine is brought back online, starter vent (FINs COMP-01-SV and COMP-02-SV) emissions occur to atmosphere as natural gas is routed through the engine as it builds up pressure.

The TCEQ Oil and Gas Spreadsheet was used to verify emissions from the engine, flare, fugitives and loading. Glycol Dehy emissions were verified by GRI-GLYCalc. WinSim was used to calculate tank flash emissions and AP-42 Chapter 7 for working and breathing emissions. Tanks 4.0 was used to verify emissions from the antifreeze and lube oil tanks.

TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR OIL AND GAS HANDLING AND PRODUCTION FACILITIES

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

RULE CHECK		
REQUIREMENTS	YES, NO, or N/A	COMMENTS
What is the distance to the nearest receptor?	---	Actual distance: <u>1,043</u> feet.
If the distance to the nearest receptor is less than 50 feet, are fugitive components used for isolation or safety purposes the only emission sources located one-half the width of any applicable easement?	N/A	
Are the total benzene emissions greater than 0.039 /b/hr?	YES	Total benzene emissions: <u>0.26</u> lb/hr
Are the project's maximum predicted concentrations of benzene at the nearest receptor equal to or less than 10% of the appropriate effects screening level (ESL)? Benzene short-term ESL: 170 µg/m³ Benzene long-term ESL: 4.5 µg/m³ <i>If "NO," an impacts evaluation for benzene must be provided demonstrating that the site meets the protectiveness limits.</i>	YES	E _{max} hourly = 7.68 lb/hr E _{max} annual = 5.82 lb/hr
What is the distance to the nearest property line?	---	Actual distance: <u>≥ 50</u> feet.
If the distance to the nearest property line or receptor is less than 50 feet, are fugitive components used for isolation or safety purposes the only emission sources located one-half the width of any applicable easement?	N/A	
Are the total H ₂ S emissions greater than 0.025 lb/hr?	YES	Total H ₂ S emissions: <u>0.05</u> lb/hr
Are the project's maximum predicted concentrations of H ₂ S at the nearest property line equal to or less than the significant impact level (SIL)? H ₂ S hourly SAAQS: 108 µg/m³ <i>If "NO," an impacts evaluation for H₂S must be provided demonstrating that the site meets the protectiveness limits.</i>	YES	E _{max} hourly = 3.40 lb/hr
Are the total SO ₂ emissions greater than 2.0 lb/hr?	NO	Total SO ₂ emissions: <u>0.20</u> lb/hr
Are the project's maximum predicted concentrations of SO ₂ at the nearest property line equal to or less than the significant level (SIL)? SO ₂ hourly SAAQS: 196 µg/m³ <i>If "NO," an impacts evaluation for SO₂ must be provided demonstrating that the site meets the protectiveness limits.</i>	N/A	
Are the total NO _x emissions greater than 4.0 lb/hr?	YES	Total NO _x emissions: <u>8.07</u> lb/hr
Are the project's maximum predicted concentrations of NO _x at the nearest property line equal to or less than the significant impact level (SIL)? NO _x hourly SAAQS: 188 µg/m³ <i>If "NO," an impacts evaluation for NO_x must be provided demonstrating that the site meets the protectiveness limits.</i>	YES	Hourly = 118.26 µg/m³ Annual = 23.86 µg/m³
Are there any engines or turbines located at the site?	YES	See engine table below.
Do the engines or turbines meet the emission and performance standards listed in Table 6?	YES	
Are there any liquid fueled engines used for back-up power generation and periodic power? <i>If "YES," the fuel must have less than or equal to 0.05% sulfur and operate less than 876 hours per rolling 12-month period.</i>	NO	
If the site has access to an electric service, do the engines or turbines meet the technical requirements of the Air Quality Standard Permit for Electric Generating Units (EGU)?	N/A	
Are there any open-topped tanks or ponds located at the site?	NO	
Is the potential to emit less than or equal to 1 tpy VOC and 0.1 tpy H ₂ S for the open-topped tanks or ponds?	N/A	
Will the site comply with all fugitive requirements listed in the Best Management Practices subsection? <i>If Leak Detection and Repair (LDAR) alternative fugitive monitoring is required, Table 9 must be met.</i>	YES	<u> x </u> < 10 tpy VOC or < 1 tpy H ₂ S _____ ≥ 10 tpy VOC or ≥ 1 tpy H ₂ S _____ ≥ 25 tpy VOC or ≥ 5 tpy H ₂ S LDAR program: _____
Are there any tanks or vessels located at the site?	YES	

TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR OIL AND GAS HANDLING AND PRODUCTION FACILITIES

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Will all tanks and vessels be of a color that minimizes the effects of solar heating as stated in the rule?	YES	
When relying on control or recovery devices in emission calculations, will the owner/operator monitor and keep records according to Table 8?	YES	
Are any of the following units needed to meet the limitations of the rule?	YES	<input checked="" type="checkbox"/> process reboilers, heaters, and furnaces (used for control) <input checked="" type="checkbox"/> vapor recovery units _____ thermal oxidation and vapor combustion devices (not including flares)
Will the appropriate level of monitoring be implemented based on any reduction efficiencies claimed?	YES	
Are there any flares or thermal oxidizers located at the site needed to meet the limitations of the rule?	YES	
Is the site in compliance with all other applicable requirements of the standard permit?	YES	

STATE AND FEDERAL STANDARDS APPLICABILITY		
STANDARDS	YES, NO, or N/A	COMMENTS
NSPS Subpart A: General Provisions	YES	
NSPS Subpart K, Ka, Kb: Storage Vessels for Petroleum Liquids	NO	
NSPS Subpart GG: Stationary Gas Turbines	N/A	
NSPS Subpart KKK: Equipment Leaks of VOC from Onshore Natural Gas Processing Plants	NO	
NSPS Subpart LLL: Onshore Natural Gas Processing: SO ₂	NO	
NSPS Subpart IIII: Stationary Compression Ignition Internal Combustion Engines	N/A	
NSPS Subpart JJJJ: Stationary Spark Ignition Internal Combustion Engines	YES	This rule applies to Compressor Engine (COMP-01).
NSPS Subpart KKKK: Stationary Combustion Turbines	N/A	
NESHAP Subpart V: Equipment Leaks (Fugitive Emission Sources)	NO	
MACT Subpart H: Organic HAPs from Equipment Leaks	NO	
MACT Subpart HH: HAPs from Oil and Natural Gas Production Facilities	YES	
MACT Subpart HHH: HAPs from Natural Gas Transmission and Storage Facilities	NO	
MACT Subpart YYYY: HAPs from Stationary Combustion Turbines	N/A	
MACT Subpart ZZZZ: HAPs from Stationary Reciprocating Internal Combustion Engines	YES	
Is the site in compliance with all other applicable rules and regulations?	YES	

ENGINE													
Engine Identifier (EPN / name)	HP	Hrs of Opr/ yr	Fuel Consum. (Btu/hp-hr)	Rich or Lean Burn	2 or 4 stk	Vendor Data Sheet Included?	Emission Factor / Origin of Emission Factor (g/hp-hr or lb/MMBtu)						Type of Control Devices
							VOC (NMNEHC)	NO _x	CO	SO ₂	PM ₁₀ / PM _{2.5}	HC HO	
COMP-01 / Cat G3508 TALE	670	8760	7510	Lean	4	Yes	1.0	2.0	3.0	10 ppm S	0.0099 871	0.0528	SCR Catalyst
COMP-02 / Cat G3508 TALE	630	8760	7820	Lean	4	Yes	1.0	2.0	3.0	10 ppm S	0.0099 871	0.42	Air-Fuel Ration Control
Does NSPS, Subpart JJJJ apply?		Yes	Why or why not? If yes, how will requirements be met?				Engine manufacture date: COMP-01 – 9/12/2008, COMP-02 – 1/15/2004.						
Does MACT, Subpart ZZZZ apply?		Yes	Why or why not? If yes, how will requirements be met?				The site will meet the HAP emissions limits and NSPS JJJJ.						

**TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR
OIL AND GAS HANDLING AND PRODUCTION FACILITIES**

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB - Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

IMPACT ANALYSIS FOR NO_x

SUMMARY OF NO_x SCREENING MODELING RESULTS

OIL AND GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB - BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

FIN	EPN	Description	PTEno _x (lb/hr)	Co _{ox} no _x ^b (g/gm ³)	GLC _{ox} no _x ^c (g/m ³)	R _{ox} no _x ^d (lb NO _x /lb NO _x)	GLC _{ox} no _x ^e (g/m ³)	Annual Conversion Factor (CF)	GLC _{ox} no _x ^f (g/m ³)
Normal Operations									
COMP-01	COMP-01	Compressor Engine 1	2.95	12.46	36.76	0.20	7.35	0.08	0.59
COMP-02	COMP-02	Compressor Engine 2	2.78	14.50	43.31	0.20	8.66	0.08	0.64
REB-1	REB-1	Glycol Reboiler No. 1	0.05	441.90	22.10	0.75	16.57	0.08	1.33
FL-1	FL-1	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-1	FL-1	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-2	FL-2	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-2	FL-2	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-3	FL-3	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-3	FL-3	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-3	FL-3	Flare Combustion (normal operations waste gas condensate)	0.58	5.70	3.31	0.75	2.48	0.08	0.20
FL-3	FL-3	Flare Combustion (normal operations waste gas Produced water)	0.01	103.80	1.04	0.75	0.78	0.08	0.06
Maintenance, Startup, and Shutdown									
FL-1-SMSS	FL-1-SMSS	Flare Combustion (engines blowdown waste gas)	0.24	11.72	2.81	0.75	2.11	0.08	0.17
FL-2-SMSS	FL-2-SMSS	Condensate and Strip Waste Gas Combustion (during VRU downtime)	0.78	4.47	3.49	0.75	2.62	0.08	0.21
FL-2-SMSS	FL-2-SMSS	Produced Water Waste Gas Combustion (during VRU downtime)	0.02	72.64	1.45	0.75	1.09	0.08	0.09
Total Engine NO_x Concentration (g/m³):							48.26		3.86
Live Oak County NO_x Background Concentration (g/m³):							70.00		28.00
Total Off-Property Concentration (g/m³):							118.26		23.86
NO_x NAAQS (g/m³):							188		100

**TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR
OIL AND GAS HANDLING AND PRODUCTION FACILITIES**

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

IMPACT ANALYSIS FOR BENZENE

**BENZENE EMISSION IMPACT ANALYSIS
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

Hourly ESL (µg/m3): 170
Annual ESL (µg/m3): 4.5

EPN	FIN	Benzene Emissions		Stack Parameters		G (µg/m³/lb/hr)	WR		Calculated Health Effects Review	
		(lb/hr)	(tpy)	Distance (ft)	Height (ft)		(hourly)	(annual)	(lb/hr)	(tpy)
Normal Operations										
COMP-01	COMP-01	0.01	0.04	1450	20	14	3.88%	11.27%	0.47	1.98
COMP-02	COMP-02	0.005	0.03	1480	20	14	2.33%	8.46%	0.28	1.49
FUG	FUG	0.02	0.09	1043	3	293	7.76%	25.37%	0.05	0.21
REB-1	REB-1	0.000001	0.000004	1830	14	76	0.0004%	0.001%	0.00001	0.00004
REB-1	DEHY-SV	0.04	0.17	1830	14	76	15.52%	47.91%	0.35	1.55
FL-3	TK-20	0.005	0.01	1752	30	31	1.94%	2.82%	0.11	0.22
FL-3	TK-21	0.0002	0.001	1752	30	31	0.08%	0.28%	0.004	0.02
VRU	TRUCK1	0.003	0.002	1270	10	264	1.16%	0.56%	0.01	0.01
VRU	TRUCK2	0.0001	0.00001	1270	10	264	0.04%	0.003%	0.0002	0.00003
FL-3	TRUCK3	0.01	0.003	1750	30	31	3.88%	0.85%	0.21	0.07
FL-3	TRUCK4	0.0001	0.00001	1750	30	31	0.04%	0.003%	0.0021	0.00022
FL-1	FL-1	0.000003	0.00001	1420	30	36	0.001%	0.003%	0.0001	0.0002
FL-2	FL-2	0.000003	0.00001	1450	30	36	0.001%	0.003%	0.0001	0.0002
FL-3	FL-3	0.000003	0.00001	1750	30	31	0.001%	0.003%	0.0001	0.0002
Maintenance, Startup, and Shutdown										
COMP-01-SV	COMP-01-SV	0.07	0.002	1450	20	16	27.16%	0.56%	2.89	0.09
FL-1-SMSS	COMP-01-BD	0.001	0.00002	1420	30	36	0.39%	0.01%	0.02	0.0004
COMP-02-SV	COMP-02-SV	0.07	0.002	1480	20	16	27.16%	0.56%	2.89	0.09
FL-1-SMSS	COMP-02-BD	0.001	0.00002	1450	30	36	0.39%	0.01%	0.02	0.0004
FL-2-SMSS	TK-01 through TK-08	0.01	0.004	1450	30	36	3.88%	1.13%	0.18	0.08
FL-2-SMSS	TK-09 through TK-10	0.001	0.0002	1450	30	36	0.39%	0.056%	0.02	0.004
FL-2-SMSS	TK-11 through TK-15	0.0002	0.0001	1450	30	36	0.08%	0.03%	0.004	0.002
FL-2-SMSS	TRUCK1	0.01	0.0004	1450	30	36	3.88%	0.11%	0.18	0.01
FL-2-SMSS	TRUCK2	0.0001	0.000002	1450	30	36	0.04%	0.001%	0.002	0.00004
Total		0.26	0.35						7.68	5.82

Impacts Analysis:

	Hourly	Annual
Calculated Benzene Emissions (lb/hr):	0.26	0.35
Calculated Benzene Health Effects Review (lb/hr):	7.68	5.82

**TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR
OIL AND GAS HANDLING AND PRODUCTION FACILITIES**

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

IMPACT ANALYSIS FOR H₂S

**H₂S EMISSION IMPACT ANALYSIS
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

State Property Line Standard (µg/m³): 108

EPN	FIN	Description	H ₂ S	Stack Parameters		G (µg/m ³ /lb/hr)	WR (hourly)	Calculated
			Emissions (lb/hr)	Distance (ft)	Height (ft)			Health Effects Review (lb/hr)
Normal Operations								
FUG	FUG	Site Fugitives	0.001	50	3	4375	1.89%	0.0005
REB-1	DEHY-SV	Glycol Dehy Still Vent	0.01	50	14	469	18.89%	0.04
FL-3	TK-20	Condensate Storage Tank at Baker	0.0002	50	30	43	0.38%	0.01
FL-3	TK-21	Produced Water Storage Tank at Baker	0.00001	50	30	43	0.02%	0.0005
FL-1	FL-1	Flare Combustion (normal operations assist, and pilot)	0.00001	50	30	43	0.02%	0.0005
FL-2	FL-2	Flare Combustion (normal operations assist, and pilot)	0.00001	50	30	43	0.02%	0.0005
FL-3	FL-3	Flare Combustion (normal operations waste gas, assist, and pilot)	0.0001	50	30	43	0.19%	0.005
Maintenance, Startup, and Shutdown								
COMP-01-SV	COMP-01-SV	Compressor Engine 1 Starter Vent	0.02	50	20	25	37.77%	1.63
FL-1-SMSS	COMP-01-BD	Compressor Engine 1 Blowdown	0.0002	50	30	43	0.38%	0.01
COMP-02-SV	COMP-02-SV	Compressor Engine 2 Starter Vent	0.02	50	20	25	37.77%	1.63
FL-1-SMSS	COMP-02-BD	Compressor Engine 2 Blowdown	0.0002	50	30	43	0.38%	0.01
FL-2-SMSS	TK-01 through TK-08	Controlled Condensate Tanks Emissions (during VRU downtime)	0.0004	50	30	43	0.76%	0.02
FL-2-SMSS	TK-10 through TK-19	Controlled Produced Water Tank Emissions (during VRU downtime)	0.00002	50	30	43	0.038%	0.001
FL-1-SMSS	FL-1-SMSS	Flare 1 Combustion (Engine blowdown waste gas)	0.0004	50	30	43	0.76%	0.02
FL-2-SMSS	FL-2-SMSS	Flare 2 Combustion (Tanks waste gas during VRU downtime)	0.0004	50	30	43	0.76%	0.02
Total			0.05	3.40				
Impacts Analysis:								
			Hourly					
Calculated H ₂ S Emissions (lb/hr):			0.05					
Calculated H ₂ S Health Effects Review (lb/hr):			3.40					

**TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR
OIL AND GAS HANDLING AND PRODUCTION FACILITIES**



Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

ESTIMATED EMISSIONS																
EPN / Emission Source	VOC		NOx		CO		PM_{10&2.5}		SO₂		H₂S		HCHO		Benzene	
	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Normal Operations																
COMP-01 / Compressor Engine 1	1.48	6.48	2.95	12.92	4.43	19.40	0.05	0.22	0.01	0.04			0.27	1.18	0.01	0.04
COMP-02 / Compressor Engine 2	1.39	6.09	2.78	12.18	4.17	18.26	0.05	0.22	0.01	0.04			0.58	2.54	0.01	0.03
FUG / Site Fugitives	2.00	8.79									<0.01	<0.01			0.02	0.09
REB-1 / Glycol Reboiler 1	<0.01	0.01	0.05	0.22	0.04	0.18	<0.01	0.02	<0.01	<0.01			<0.01	<0.01	<0.01	<0.01
REB-1/DEHY-SV / Glycol Dehy Still Vent	0.78	3.41									0.01	0.05			0.04	0.17
FL-3/TK-19 / Condensate Storage Tank (Baker)	1.47	5.15									<0.01	<0.01			0.01	0.01
FL-3/TK-20 / Produced Water Storage Tank (Baker)	0.04	0.17									<0.01	<0.01			<0.01	<0.01
TK-AF / Antifreeze Liquid Storage	0.50	0.01														
TK-LO / Lube Oil Liquid Storage	<0.01	<0.01														
TK-SCAV / H ₂ S Scavenger Liquid Storage	<0.01	<0.01														
VRU/TRUCK1 / Condensate and Slop Tank Truck Loading (Sugarkane)	0.63	0.47													<0.01	<0.01
VRU/TRUCK2 / Produced Water Tank Truck Loading (Sugarkane)	0.01	<0.01													<0.01	<0.01
FL-3/TRUCK3 / Condensate Tank Truck Loading (Baker)	1.58	0.72													0.01	<0.01
FL-3/TRUCK4 / Produced Water Tank Truck Loading (Baker)	0.02	<0.01													<0.01	<0.01
FL-1 / Flare Combustion (assist and pilot)	0.01	0.04	0.22	0.97	0.45	1.97	<0.01	<0.01	0.03	0.13	<0.01	<0.01			<0.01	<0.01
FL-2 / Flare Combustion (assist and pilot)	0.01	0.04	0.22	0.97	0.45	1.97	<0.01	<0.01	0.03	0.13	<0.01	<0.01			<0.01	<0.01
FL-3 / Flare 3 (Baker waste gas, assist and pilot)	0.01	0.04	0.81	2.34	1.62	4.70	<0.01	<0.01	0.04	0.15	<0.01	<0.01			<0.01	<0.01
Scheduled Maintenance, Startup and Shutdown Events																
COMP-01-SV / Compressor Engine 1 Starter Vent	16.88	0.44									0.02	<0.01			0.07	<0.01
FL-1-SMSS/COMP-01-BD / Compressor Engine 1 Blowdown	0.26	0.01									<0.01	<0.01			<0.01	<0.01
COMP-02-SV / Compressor Engine 2 Starter Vent	16.88	0.44									0.02	0.02			0.07	<0.01
FL-1-SMSS/COMP-02-BD / Compressor Engine 2 Blowdown	0.24	0.01									<0.01	<0.01			<0.01	<0.01
FL-2-SMSS /TK-01 thru TK-08 / Condensate Tanks at Sugarkane (during VRU downtime)	2.14	1.10									<0.01	<0.01			0.01	<0.01

**TECHNICAL REVIEW: AIR QUALITY STANDARD PERMIT FOR
OIL AND GAS HANDLING AND PRODUCTION FACILITIES**

Permit No.:	108166	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Sally Bittick
Project No.:	190124	Site/Area Name:	Sugarkane CTB – Baker Dehy	SP No.:	6002 - NON RULE 2011-FEB-27

FL-02-SMSS/TK-09 / Slop Tank at Sugarkane (during VRU downtime)	0.18	0.05														<0.01	<0.01
FL-2-SMSS/TK-10 thru TK-18 / Produced Water Tank at Sugarkane (during VRU downtime)	0.08	0.03									<0.01	<0.01				<0.01	<0.01
FL-2-SMSS/TRUCK1 / Condensate and Slop Tank Truck Loading at Sugarkane (during VRU downtime)	1.58	0.09														0.01	<0.01
FL-2-SMSS/TRUCK2 / Produced Water Tank Truck Loading at Sugarkane (during VRU downtime)	0.02	<0.01														<0.01	<0.01
FL-1-SMSS / Flare 1 (engine blowdown waste gas)			0.24	0.01	0.48	0.01	<0.01	<0.01	0.04	<0.01							
FL-2-SMSS / Flare 2 (tanks waste gas during VRU downtime)			0.80	0.30	1.59	0.58	<0.01	<0.01	0.04	0.02							
TOTAL EMISSIONS (TPY):		33.60		29.91		47.07		0.46		0.52		0.08			3.72		0.35
MAXIMUM OPERATING SCHEDULE:			Hours/Day	24	Days/Week	7	Weeks/Year	52	Hours/Year	8760							

	TECHNICAL REVIEWER	PEER REVIEWER	FINAL REVIEWER
SIGNATURE:			 See Hard Copy.
PRINTED NAME:	Ms. Sally Bittick		Ms. Anne Inman, P.E., Manager
DATE:	March 19, 2013		March 19, 2013

BASIS OF PROJECT POINTS	POINTS
Base Points:	2.50
Project Complexity Description and Points:	
Completed project in 14 days or less	1.00
NO ₂ NAAQS 1-hr Screen	1.00
Extra EPN's	2.00
Extra calculations	1.00
Technical Reviewer Project Points Assessment:	7.50
Final Reviewer Project Points Confirmation:	

03/19/2013 -----NSR IMS - PROJECT RECORD -----*EMAIL*

PROJECT#: 190124 PERMIT#: 108166 STATUS: PENDING
RECEIVED: 03/08/2013 PROJTYPE: INITIAL AUTHTYPE: STDPMT
RENEWAL: *3/19/23*
PROJECT ADMIN NAME: SUGARKANE CENTRAL BATTERY 1
PROJECT TECH NAME: SUGARKANE CTB - BAKER DEHY UNIT

DISP CODE: *C*
ISSUED DT: *3/19/12*

Assigned Team:RULE REG SECTION**STAFF ASSIGNED TO PROJECT:**

WILBORN , JESSIE - REVIEWR1_2 - AP INITIAL REVIEW
BITTICK , SALLY - REVIEW ENG - RR TEAM

*7.5 Am 1***CUSTOMER INFORMATION (OWNER/OPERATOR DATA)**

ISSUED TO: BURLINGTON RESOURCES OIL & GAS COMPANY LP
COMPANY NAME: Burlington Resources Oil & Gas Company LP
CUSTOMER REFERENCE NUMBER: **CN602989436**

REGULATED ENTITY/SITE INFORMATION

REGULATED ENTITY NUMBER: **RN105698112** ACCOUNT:
PERMIT NAME: SUGARKANE CENTRAL BATTERY 1

REGULATED ENTITY LOCATION: FROM WHITSETT TX GO NE ON FM 99 4.9 MI CONTINUE STRAIGHT ON FM 1091 7.7 MI TURN L ON FM 882 AND GO 4.3 MI TURN R ON CR 246 AND GO 1.3 MI LEASE RD WILL BE ON L FOLLOW LEASE RD 1.0 MI TO SITE ENTRANCE ON L

REGION 14 - CORPUS CHRISTI NEAR CITY: WHITSETT COUNTY: LIVE OAK

CONTACT DATA

CONTACT NAME: MR RANDY BLACK CONTACT ROLE: RESPONSIBLE OFFICIAL

JOB TITLE: MANAGER OF PRODUCTION OPERATIONS GCBU ORGANIZATION: BURLINGTON RESOURCES OIL & GAS COMPANY LP

MAILING ADDRESS: 600 N DAIRY ASHFORD RD , WESTLAKE 3, 15012, HOUSTON, TX, 77079-

PHONE: (832) 486-6508 Ext: 0

EMAIL: RANDY.C.BLACK@CONOCOPHILLIPS.COM

ALT PHONE: (832) 486-6508 Ext: 0

CONTACT NAME: MR JAMES WOODALL

CONTACT ROLE: TECHNICAL CONTACT

JOB TITLE: SR ENVIRONMENTAL SPECIALIST

ORGANIZATION: BURLINGTON RESOURCES OIL & GAS COMPANY LP

MAILING ADDRESS: 600 N DAIRY ASHFORD RD , WESTLAKE 3, 15012, HOUSTON, TX, 77079-
 PHONE: (832) 486-6508 Ext: 0
 FAX: (832) 486-6431 Ext: 0
 EMAIL: JAMES.WOODALL@CONOCOPHILLIPS.COM
 ALT PHONE: (832) 486-6508 Ext: 0

PROJECT NOTES:

03/11/2013 DFC 03/11/2013

PERMIT NOTES:**FEE:**

Reference	Fee Receipt Number	Amount	Fee Receipt Date	Fee Payment Type
25204		850.00		CHECK

TRACKING ELEMENTS:

TE Name	Start Date	Complete Date
APIRT RECEIVED PROJECT (DATE)	03/08/2013	
APIRT TRANSFERRED PROJECT TO TECHNICAL STAFF (DATE)	03/11/2013	
CENTRAL REGISTRY UPDATED	03/11/2013	03/11/2013
PROJECT RECEIVED BY ENGINEER (DATE)	03/12/2013	
ENGINEER INITIAL REVIEW COMPLETED (DATE)	03/15/2013	
PEER / MANAGER REVIEW PERIOD	03/19/2013	03/20/2013
COMPLIANCE HISTORY REVIEW COMPLETED (DATE)		
DRAFT PERMIT RFC SENT TO REGION (DATE)		
FINAL PACKAGE REWORK CYCLE		
FINAL PACKAGE TO SECTION MANAGER FOR REVIEW (DATE)		
FINAL PACKAGE TO TEAM LEADER OR SUPERVISOR FOR REVIEW (DATE)		
PROJECT FORWARDED TO ADMIN (DATE)		
PROJECT RECEIVED BY TECHNICAL STAFF FROM APIRT (DATE)		
WPO FINAL PACKAGE CYCLE		

UNIT TYPES:**Project Unit Type:**

Industry Group	Industry Type	Source Type	Control/BACT Type	Request	Authorization
CHEMICAL	OIL AND GAS				

PROJECT RULES:

Unit Desc	Rule Desc	Request Type	On Application	Approve
OIL AND GAS PRODUCTION FACILITIES	6002 - NON RULE 2011-FEB-27 -	ADD	Y	APPROVE

PERMIT RULES:

Unit Desc	Rule Desc	Start Date	End Date
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PROJECT ATTRIBUTES:

Attributes	Value
MSS- 101.222(H)(1)	E
PROJECT POINT	

PERMIT VOIDS:

Permit	Void Reason
87632	COMPANY REQUESTED

106.352 and SP Oil and Gas Initial Screening Sheet

Due to WL/TL BY: 3/22/2013

Company: Hunt Oil Company, LP	Permit No.: 108166	Project No.: 190124
Date of Initial Review: <u>3/15/2013</u>		
Date of Initial Phone Call : <u>3/18/2013</u>		
Reviewer: <u>Sally Bittick</u>		
Have you initiated a deficiency process? Yes <input type="checkbox"/> / No <input checked="" type="checkbox"/> If yes, what date was it initiated? _____		

☐ For non-Barnett Shale SP: 106.261/106.262 speciation of all project emissions (excluding engines/turbines)

Comments: _____

☒ Lab Analysis

- ☐ Actual site ☒ Representative ☒ Included justification for representative analysis
☐ Sweet ☒ Sour ☐ Analysis tested for H₂S ☐ >1/4 mile to receptor (non-BSh PBR) Minimum vent height met? ☐ Yes ☐ No
☒ Gas ☒ Liquids ☐ Flash Gas Notes: _____

Comments: _____

☒ Tank Emissions

- ☒ Condensate ☐ Crude oil ☒ Produced water ☒ Other liquids: Antifreeze, Lube Oil, H₂S Scavenger
☒ TANKS 4.0 ☐ E&P Tanks ☒ Other method: AP-42, Ch. 7
☒ Flash: WinSim
☒ Emissions are controlled by: Flare

Comments: _____

☒ Truck Loading

- ☒ Condensate ☐ Crude oil ☒ Produced water
☒ 12.46 x SPM/T ☐ Other method: _____
☒ Emissions controlled by: Flare ☒ Collection efficiency: 98.7 % ☒ Control efficiency: 98 %

Comments: _____

☒ Compressor Engines/Turbines

- ☒ Manufacturer spec. sheets or equivalent ☐ If controlled, control spec. sheets or equiv. ☒ modeling for NO₂ NAAQS
 Meet NSPS JJJ ☒ Yes ☐ No ☐ NA ☒ MACT ZZZZ ☐ property line distance or stack height method

Comments: _____

☒ Fugitives

- ☒ Gas ☒ Liquids ☒ used TCEQ emission factors

Comments: _____

☒ Glycol Units

- ☒ GRI-GLYCalc ☒ Extended analysis and prior to glycol inlet? ☒ Yes ☐ No

Comments: _____

☒ Control Devices

- ☒ Flare ☐ Combustor ☐ Thermal Oxidizer ☐ VRU
☐ NSPS 60.18 Alternate operating scenario included? ☐ Yes ☒ No
 Control efficiency: 98 % If over baseline efficiency, description/justification provided? ☐ Yes ☐ No

Comments: _____

☒ MSS (optional until January 5, 2014)

- ☒ Description of activity, duration, and frequency

Comments: _____

Date 3/30/2012

EFSCOP00004094

Sally Bittick

From: Woodall, James <James.Woodall@conocophillips.com>
Sent: Tuesday, March 12, 2013 12:21 PM
To: airog; Black, Randy C
Cc: Sally Bittick
Subject: RE: TCEQ APD Info. Request for Burlington Resources Oil & Gas Company LP, Sugarkane Central Battery 1, Registration 108166

Afternoon,

1. We agree to receive the letter electronically.
2. We have implemented the project
3. The site is already constructed, we are not waiting for additional word from TCEQ
4. No updates at this time

Thank you!

From: airog [<mailto:airog@tceq.texas.gov>]
Sent: Tuesday, March 12, 2013 12:19 PM
To: Black, Randy C; Woodall, James
Cc: Sally Bittick
Subject: [EXTERNAL]TCEQ APD Info. Request for Burlington Resources Oil & Gas Company LP, Sugarkane Central Battery 1, Registration 108166

Please respond to all. The reviewer has been copied on this email.

Registration Number: 108166
Company Name: Burlington Resources Oil & Gas Company LP
Site Name: Sugarkane Central Battery 1
Regulated Entity Number: RN105698112

The TCEQ Air Permits Division Rule Registrations Section has received a registration under PBR 6002 - NON RULE 2011-FEB-27.

Please respond to the following:

1. Please confirm if the company agrees to receive the response letter electronically and that no hard copy will need to be sent. All completed projects can be viewed at: <https://webmail.tceq.state.tx.us/gw/webpub>.
2. If the company has implemented the project.
3. If the company is waiting on a response from the TCEQ before starting construction.
4. If you have any updates to the project listed above, please send them in now.

Please note that these items constitute an initial review only. A full technical review may be completed at a later date and additional questions may be added. **We would appreciate a complete response within five business days of the date of this e-mail.** Please only respond once you have fully addressed each of the requested items.

Please reply to this AirOG e-mail address or call (512) 239-1250 and ask to speak to someone in the Rules & Registration Section if you have questions or concerns regarding this email.

The TCEQ continually strives to provide quality customer service and we value your opinion. We encourage you to tell us about your experience and how you believe we can improve. We ask that you take a moment to complete our [customer survey](#) to assist us in serving you better in the future.

Thank you for helping to protect the environment in Texas,

DEPOSIT INFORMATION FORM

TODAY'S DATE: 03/11/2013

PERMIT/REGISTRATION NO: 108166

CUSTOMER ACCOUNT _____ NA _____

*If the customer has no account number please indicate "NA"

CHECK AMOUNT: \$850.00

CHECK DATE: 3/04/2013

CHECK MAKER: *Titan Engineering Inc for Burlington Resources*
PAID FOR: PBR *Oil & Gas Company LP*
(If different from check maker)

PERSON TAKING BACKUP: Jessie Wilborn

PROGRAM/DIVISION: OPRR/APD

TELEPHONE NUMBER: 512/239-1770

CASH ONLY IF ALL CheckLock™ SECURITY FEATURES LISTED ON BACK INDICATE NO TAMPERING OR COPYING

TITAN ENGINEERING, INC.
2801 NETWORK BLVD, SUITE 200
FRISCO, TX 75034

BANK OF TEXAS, NA
DALLAS, TX
32-1432/1110

25204

3/4/2013

PAY TO THE
ORDER OF TCEQ

\$ **850.00

Eight Hundred Fifty and 00/100*****

DOLLARS

Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Agency Fee: 84800507-78.001

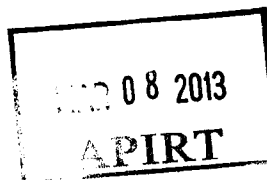
VOID AFTER 90 DAYS

⑈025204⑈ ⑆11014325⑆ ⑈8092671152⑈



Texas Commission on Environmental Quality
Form PI-1S
Registrations for Air Standard Permit
(Page 1)

I. Registrant Information		
A. Is a TCEQ Core Data Form (TCEQ Form No. 10400) attached? Core Data Form required for Standard Permits 6004, 6006, 6007, 6008, and 6013.		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Customer Reference Number (CN): CN602989436		
Regulated Entity Number (RN): RN105698112		
B. Company or Other Legal Customer Name (must be same as Core Data "Customer"): Burlington Resources Oil & Gas Company LP		
Company Official Contact Name: Randy Black		
Title: Manager of Production Operations - GCBU		
Mailing Address: 600 N Dairy Ashford, Westlake 3, #15012		
City: Houston	State: TX	ZIP Code: 77079
Phone No.: 832-486-6508	Fax No.: 832-486-6431	E-mail Address: randy.c.black@conocophillips.com
C. Technical Contact Name: James Woodall		
Title and Company: Sr. Environmental Specialist		
Mailing Address: 600 N Dairy Ashford, Westlake 3, #15012		
City: Houston	State: TX	ZIP Code: 77079
Phone No.: 832-486-6508	Fax No.: 832-486-6431	E-mail Address: james.woodall@conocophillips.com
D. Facility Location Information (Street Address):		
If no street address, provide clear driving directions to the site in writing:		
From Whitsett TX, travel northeast on FM 99 for 4.9 miles. Continue straight on FM 1091/245 for 7.7 miles. Turn left onto FM 882 and travel 4.3. Turn right on Co Rd 246 and follow for 1.3 miles. Lease road will be on left. Follow lease road for 1.0 mile to Site entrance on left.		
City: Whitsett	County: Live Oak	ZIP Code: 78119
Latitude (nearest second): 28°41'57.74"N		Longitude (nearest second): 98° 3'28.16"W
II. Facility and Site Information		
A. Name and Type of Facility: Sugarkane CTB - Baker Dehy Unit		<input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary
B. Type of Action:		
<input checked="" type="checkbox"/> Initial Application <input type="checkbox"/> Renewal <input type="checkbox"/> Change to Registration		
<input checked="" type="checkbox"/> Registration No.: 96022, 108166 ✓ <input type="checkbox"/> Expiration Date:		
C. List the Standard Permit Claimed: 6002		
Description: Oil and Gas Facilities		





Texas Commission on Environmental Quality
Registrations for Air Standard Permit
PI-1S
(Page 2)

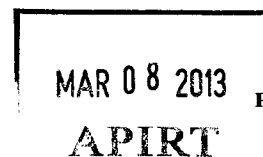
II. Facility and Site Information (continued)										
D. Concrete Batch Plant Standard Permit (Check one) <input type="checkbox"/> Central Mix <input type="checkbox"/> Ready Mix <input type="checkbox"/> Specialty Mix <input type="checkbox"/> Enhanced Controls for Concrete Batch Plants										
E. Proposed Start of Construction:	Length of Time at the Site:									
F. Is there a previous Standard Exemption or Permit by Rule for the facilities in this registration? (Attach details regarding changes)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO									
If "YES," list Permit No.: 87682										
G. Are there any other facilities at this site which are authorized by an air Standard Permit?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO									
If "YES," list Permit No.:										
H. Are there any other air preconstruction permits at this site?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO									
If "YES," list Permit No.:										
Are there any other air preconstruction permits at this site that would be directly associated with this project?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO									
If "YES," list Permit No.:										
I. TCEQ Account Identification Number (if known):										
J. Is this facility located at a site which is required to obtain a federal operating permit pursuant to 30 TAC Chapter 122?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> To Be Determined									
K. Identify the requirements of 30 TAC Chapter 122 that will be triggered if this Form PI-1S application is approved. <table style="width: 100%;"><tr><td><input type="checkbox"/> Application for an FOP</td><td><input type="checkbox"/> FOP Significant Revision</td><td><input type="checkbox"/> FOP Minor</td></tr><tr><td><input type="checkbox"/> Operational Flexibility/Off-Permit Notification</td><td></td><td><input type="checkbox"/> Streamlined Revision for GOP</td></tr><tr><td><input type="checkbox"/> To Be Determined</td><td></td><td><input checked="" type="checkbox"/> None</td></tr></table>		<input type="checkbox"/> Application for an FOP	<input type="checkbox"/> FOP Significant Revision	<input type="checkbox"/> FOP Minor	<input type="checkbox"/> Operational Flexibility/Off-Permit Notification		<input type="checkbox"/> Streamlined Revision for GOP	<input type="checkbox"/> To Be Determined		<input checked="" type="checkbox"/> None
<input type="checkbox"/> Application for an FOP	<input type="checkbox"/> FOP Significant Revision	<input type="checkbox"/> FOP Minor								
<input type="checkbox"/> Operational Flexibility/Off-Permit Notification		<input type="checkbox"/> Streamlined Revision for GOP								
<input type="checkbox"/> To Be Determined		<input checked="" type="checkbox"/> None								
L. Identify the type(s) issued and/or FOP application(s) submitted/pending for the site. (check all that apply) <table style="width: 100%;"><tr><td><input type="checkbox"/> SOP <input type="checkbox"/> GOP <input type="checkbox"/> GOP Application/Revision Application: Submitted or Under APD Review</td></tr><tr><td><input type="checkbox"/> SOP Application Review Application: Submitted or Under APD Review <input checked="" type="checkbox"/> N/A</td></tr></table>		<input type="checkbox"/> SOP <input type="checkbox"/> GOP <input type="checkbox"/> GOP Application/Revision Application: Submitted or Under APD Review	<input type="checkbox"/> SOP Application Review Application: Submitted or Under APD Review <input checked="" type="checkbox"/> N/A							
<input type="checkbox"/> SOP <input type="checkbox"/> GOP <input type="checkbox"/> GOP Application/Revision Application: Submitted or Under APD Review										
<input type="checkbox"/> SOP Application Review Application: Submitted or Under APD Review <input checked="" type="checkbox"/> N/A										





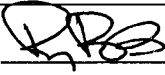
Texas Commission on Environmental Quality
Registrations for Air Standard Permit
PI-1S
(Page 3)

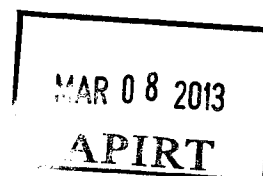
III. Fee Information		
A. Is a copy of the check or money order attached?		<input checked="checked" type="checkbox"/> YES <input type="checkbox"/> NO
Check/Money Order/Transaction Number: 25204		
Company name on Check: TITAN Engineering, Inc.		
Fee Amount: \$850.00		
IV. Public Notice (If Applicable)		
A. Is the plant located at a site contiguous or adjacent to the public works project?		<input type="checkbox"/> YES <input type="checkbox"/> NO
B. Name of Public Place:		
Physical Address:		
City:	County:	
C. Small Business Classification:		<input type="checkbox"/> YES <input type="checkbox"/> NO
D. Concrete batch plants with enhanced controls, permanent rock crushers, and animal carcass incinerators shall place a copy of the technically complete application at the appropriate TCEQ regional office only.		
E. Please furnish the names of the state legislators who represent the area where the facility site is located:		
State Senator:		
State Representative:		
F. For Concrete Batch Plants, name of the County Judge for this facility site:		
County Judge:		
Mailing Address:		
City:	State:	ZIP Code:
G. For Concrete Batch Plants, is the facility located in a municipality and/or extraterritorial jurisdiction of a municipality?		<input type="checkbox"/> YES <input type="checkbox"/> NO
If "YES," list the name(s) of the Presiding Officer(s) for the municipality and/or extraterritorial jurisdiction:		
Presiding Officer(s):		
Title:		
Mailing Address:		
City:	State:	ZIP Code:





**Texas Commission on Environmental Quality
Registration for Air Standard Permit
Form PI-1S
(Page 4)**

V. Technical Information Including State and Federal Regulatory Requirements Registrants must be in compliance with all applicable state and federal regulations and standards to claim a Standard Permit.	
A. Is confidential information submitted and properly marked with this registration?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
B. Is a process flow diagram and a process description attached?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
C. Is a plot plan attached?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
D. Are emissions data and calculations for this claim attached?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
E. Is information attached showing how the general requirements and applicability (30 TAC 116.610 and 116.615) are met?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
F. Is information attached showing how the specific requirements are met?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
VI. Delinquent Fees and Penalties	
This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ is paid in accordance with the Delinquent Fee and Penalty Protocol. For more information regarding Delinquent Fees and Penalties, go to the TCEQ Web site at: www.tceq.texas.gov/agency/delin/index.html .	
VII. Signature Requirements	
The signature below indicates that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7, Texas Clean Air Act (TCAA), as amended, or any of the air quality rules and regulations of the Texas Commission on Environmental Quality or any local governmental ordinance or resolution enacted pursuant to the TCAA. I further state that I have read and understand TWC 7.177 and 7.183, which defines Criminal Offenses for certain violations, including intentionally or knowingly making or causing to be made false material statements or representations in this application, and TWC 7.187, pertaining to Criminal Penalties .	
Name: <u>Randy Black</u>	
<i>Print Full Name</i>	
Signature: <u></u>	
<i>Original Signature Required</i>	
Date: <u>2/25/13</u>	





TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided)			
<input checked="" type="checkbox"/>	New Permit, Registration or Authorization (Core Data Form should be submitted with the program application)		
<input type="checkbox"/>	Renewal (Core Data Form should be submitted with the renewal form)	<input type="checkbox"/>	Other
2. Attachments Describe Any Attachments: (ex. Title V Application, Waste Transporter Application, etc.)			
<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
Oil and Gas Standard Permit Registration			
3. Customer Reference Number (if issued)		4. Regulated Entity Reference Number (if issued)	
CN 602989436		RN 105698112	

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)							
6. Customer Role (Proposed or Actual) – as it relates to the <u>Regulated Entity</u> listed on this form. Please check only <u>one</u> of the following:							
<input type="checkbox"/>	Owner	<input type="checkbox"/>	Operator	<input checked="" type="checkbox"/>	Owner & Operator		
<input type="checkbox"/>	Occupational Licensee	<input type="checkbox"/>	Responsible Party	<input type="checkbox"/>	Voluntary Cleanup Applicant	<input type="checkbox"/>	Other: _____
7. General Customer Information							
<input type="checkbox"/>	New Customer	<input type="checkbox"/>	Update to Customer Information	<input checked="" type="checkbox"/>	Change in Regulated Entity Ownership		
<input type="checkbox"/>	Change in Legal Name (Verifiable with the Texas Secretary of State)	<input type="checkbox"/> No Change**					
**If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.							
8. Type of Customer:		<input checked="" type="checkbox"/>	Corporation	<input type="checkbox"/>	Individual	<input type="checkbox"/>	Sole Proprietorship- D.B.A
<input type="checkbox"/>	City Government	<input type="checkbox"/>	County Government	<input type="checkbox"/>	Federal Government	<input type="checkbox"/>	State Government
<input type="checkbox"/>	Other Government	<input type="checkbox"/>	General Partnership	<input type="checkbox"/>	Limited Partnership	<input type="checkbox"/>	Other: _____
9. Customer Legal Name (If an individual, print last name first: ex: Doe, John)				If new Customer, enter previous Customer below		End Date:	
Burlington Resources Oil & Gas Company LP				ConocoPhillips Company			
10. Mailing Address:		600 N DAIRY ASHFORD RD					
		Westlake 3, 15012					
	City	HOUSTON	State	TX	ZIP	77079	ZIP + 4
11. Country Mailing Information (if outside USA)					12. E-Mail Address (if applicable)		
13. Telephone Number		14. Extension or Code		15. Fax Number (if applicable)			
8324866508				8324866431			
16. Federal Tax ID (9 digits)		17. TX State Franchise Tax ID (11 digits)		18. DUNS Number (if applicable)		19. TX SOS Filing Number (if applicable)	
		32003073841		131117566		14500511	
20. Number of Employees						21. Independently Owned and Operated?	
<input type="checkbox"/>	0-20	<input type="checkbox"/>	21-100	<input type="checkbox"/>	101-250	<input type="checkbox"/>	251-500
<input checked="" type="checkbox"/>	501 and higher					<input checked="" type="checkbox"/>	Yes
					<input type="checkbox"/>	No	

SECTION III: Regulated Entity Information

22. General Regulated Entity Information (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)							
<input type="checkbox"/>	New Regulated Entity	<input checked="" type="checkbox"/>	Update to Regulated Entity Name	<input checked="" type="checkbox"/>	Update to Regulated Entity Information	<input type="checkbox"/>	No Change** (See below)
**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.							
23. Regulated Entity Name (name of the site where the regulated action is taking place)							
Sugarkane CTB - Baker Dehy Unit							

MAR 08 2013
APIRT

24. Street Address of the Regulated Entity: (No P.O. Boxes)							
	City		State		ZIP		ZIP + 4
25. Mailing Address:	600 N Dairy Ashford						
	Westlake 3, #15012						
	City	Houston	State	TX	ZIP	77079	ZIP + 4
26. E-Mail Address:	james.woodall@conocophillips.com						
27. Telephone Number	28. Extension or Code			29. Fax Number (if applicable)			
(832) 486-6508				832-486-6431			
30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)		32. Primary NAICS Code (5 or 6 digits)		33. Secondary NAICS Code (5 or 6 digits)		
1311			211111				
34. What is the Primary Business of this entity? (Please do not repeat the SIC or NAICS description.)							
Natural Gas Treatment							

Questions 34 - 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	From Whitsett TX, travel northeast on FM 99 for 4.9 miles. Continue straight on FM 1091/245 for 7.7 miles. Turn left onto FM 882 and travel 4.3. Turn right on Co Rd 246 and follow for 1.3 miles. Lease road will be on left. Follow lease road for 1.0 mile to Site entrance on left.					
36. Nearest City	County		State		Nearest ZIP Code	
Whitsett	Live Oak		TX		78119	
37. Latitude (N) In Decimal:	38. Longitude (W) In Decimal:					
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds	
28	41	57.74	98	3	28.16	

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Industrial Hazardous Waste	<input type="checkbox"/> Municipal Solid Waste
<input checked="" type="checkbox"/> New Source Review - Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS	<input type="checkbox"/> Sludge
<input type="checkbox"/> Stormwater	<input type="checkbox"/> Title V - Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil	<input type="checkbox"/> Utilities
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Waste Water	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

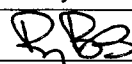
SECTION IV: Preparer Information

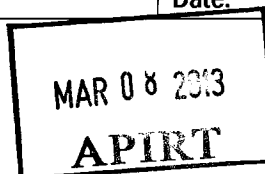
40. Name:	James Woodall		41. Title:	Sr. Environmental Specialist	
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address		
(832) 486-6508	N/A		james.woodall@conocophillips.com		

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Burlington Resources Oil & Gas Company LP	Job Title:	Manager of Production Operations-GCBU		
Name (In Print):	Randy Black	Phone:	(832) 486-6508		
Signature:		Date:	2/25/13		





TITAN Engineering, Inc.
Environmental Consulting and Management

AIR PERMITS DIVISION

MAR 08 2013

RECEIVED

MAR 08 2013
APIRT

March 7, 2013

Air Permits Initial Review Team (APIRT) Section, MC 161
Texas Commission on Environmental Quality
12100 Park 35 Circle, Building C, Third Floor
Austin, Texas 78753

via FedEx

Subject: Oil and Gas Standard Permit Registration
Burlington Resources Oil & Gas Company LP
Sugarkane CTB – Baker Dehy Unit
Live Oak County, Texas
CN602989436, RN105698112

Dear Mr. Johnny Bowers:

On behalf of Burlington Resources Oil & Gas Company LP (Burlington), TITAN Engineering, Inc. (TITAN) is submitting this Oil and Gas Standard Permit (SP) Registration to the Texas Commission on Environmental Quality (TCEQ) for operations at Sugarkane CTB – Baker Dehy Unit (the Site) located near Whitsett in Live Oak County, TX. Upon authorization, this standard permit will authorize the following project:

- Two (2) compressor engines and associated starter vents and blowdowns;
- One (1) glycol dehydration unit;
- Nine (9) controlled atmospheric condensate storage tanks and associated loading;
- Ten (10) controlled atmospheric produced water storage tank and associated loading;
- One (1) controlled atmospheric slop storage tank and associated loading;
- One (1) vapor recovery unit (VRU) control device;
- Three (3) flare combustion control devices; and,
- Piping and fugitive components.

TITAN and Burlington Resources believe that the Site and its associated air emissions meet the requirements of the TCEQ Non-Rule Standard Permit for Oil and Gas Handling and Production Facilities and 30 TAC §116.610, §116.611, §116.614, and §116.615. Please note that this site was permitted under a Permit by Rule (Permit number 87632). Please void the PBR registration for this Site upon approval of this Standard Permit submittal and note that with the inclusion of the Core Data form, a name change is requested for this RN. Additionally, this Site was previously permitted under CN601674351, for that reason a Core Data Form is being included in this registration to update the current customer and site information on the Central Registry (CR) to CN602989436. This Standard Permit Registration (Permit number 108166) has been prepared in

TITAN Engineering, Inc. is a Division of Apex Companies, LLC 

2801 Network Boulevard, Suite 200, Frisco, TX 75034 T 469.365.1100 F 469.365.1199 www.titanengineering.com

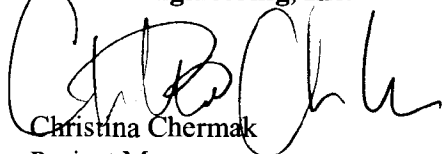
accordance with TCEQ guidance and includes the following attachments:

- Attachment 1 presents a process description, area map, receptor map, process flow diagram, and plot plan;
- Attachment 2 contains the applicable TCEQ forms and tables;
- Attachment 3 presents emission rate calculations;
- Attachment 4 describes how the Site qualifies for Standard Permit;
- Attachment 5 includes an impacts evaluation; and
- Attachment 6 includes supporting documentation.

TITAN and Burlington would like to collectively thank you in advance for your review and concurrence with this Oil and Gas Standard Permit Registration. If you have any questions regarding the information presented in this letter and attachments, please do not hesitate to contact Mr. James Woodall at 832-486-6508 or james.woodall@conocophillips.com or me at 469-365-1168 or cchermak@titanengineering.com.

Sincerely,

TITAN Engineering, Inc.



Christina Chermak
Project Manager

Attachments

cc: Ms. Rosario Torres, TCEQ Region 14 – Corpus Christi
Mr. James Woodall, Sr. Environmental Specialist, ConocoPhillips Company
TCEQ Revenue Section, MC-214, Bldg. A, Third Floor, Austin, Texas 78753 (Form PI-1S, CORE Data form, and fee only)

**OIL AND GAS STANDARD PERMIT
REGISTRATION**

*CN602989436
RN105698112*

*Burlington Resources Oil & Gas Company LP
Sugarkane CTB – Baker Dehy Unit
Live Oak County, Texas*

Project No. 84800507-78.001

February 2013

TITAN ENGINEERING, INC.



ATTACHMENT 1
PROCESS/PROJECT DESCRIPTION
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB – BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 1 PROCESS/PROJECT DESCRIPTION

This Standard Permit registration is being submitted to authorize the co-location of two sites; Sugarkane CTB and Baker Dehy Unit. The aggregate site includes two (2) compressor engines and associated blowdown and starter vent events, one (1) glycol dehydration unit, nine (9) controlled atmospheric condensate storage tanks and associated loading, ten (10) controlled atmospheric produced water storage tanks and associated loading, one (1) controlled atmospheric slop storage tank and associated loading, one (1) vapor recovery unit (VRU) control device, three (3) flare combustion control devices, atmospheric chemical and lube oil storage tanks and piping and fugitive components (the Project) at the Sugarkane CTB – Baker Dehy Unit (the Site) located in Live Oak County, Texas. Figure 1-1 is an area map showing the location of the Site and the surrounding area and Figure 1-2 is a map demonstrating the nearest receptor. Figure 1-3 is a process flow diagram for the Site and Figure 1-4 is a plot-plan of the site demonstrating the location of various equipment components.

Normal Operations

The aggregated Site will receive High Pressure (HP) gas, Low Pressure (LP) gas, and liquids (condensate and water) from eight (8) wells upstream. The gas off the HP and LP separators at the well sites will be metered and enter into their respective HP and LP headers and pipelines. LP gas will flow through the LP scrubber and be sent through compression (Facility Identification Numbers [FINs] COMP-01 and COMP-02) before entering the HP line. Fuel gas to the compressor is injected with H₂S scavenger liquid, which will treat the gas H₂S to 10 ppm or less. HP gas flows into the Site and comingles with the compressor discharge. The combined streams will then pass through a slug catcher and then be treated in a glycol contactor tower. The treated gas is then metered and sent to sales.

The tri-ethylene glycol used in the contactor tower is part of a regenerative system located at the Baker Dehy Unit pad. The rich glycol is first routed through a flash tank which collects off gas and is recompressed and recycled throughout the Site. The rich glycol is sent from the flash tank through the regeneration unit where it is heated (FIN REB-1) and the water is removed, then re-sent to the contactor tower as lean glycol. Emissions associated with the dehy regenerator still vent (FIN DEHY-SV) are controlled by the BTEX condenser and sent back to the reboiler for combustion with the fuel gas.

Pressurized liquids at the Baker site will be measured and sent to a condensate (FIN TK-19) and produced water tanks (FIN TK-20). Emissions from both tanks are captured and controlled with a 98% efficiency by a flare combustion control device (FIN FL-3). The tanks are loaded out periodically by truck (FIN TRUCK3 and TRUCK4).

Pressurized liquids at the Sugarkane CTB will be measured and flow through a separator at the Site. Condensate is sent to and stored in condensate storage tanks (FINs TK-01 through TK-08). The water is routed to the produced water tank (FINs TK-10 through TK-18). The free liquids from the compressor scrubbers, fuel gas scrubbers, and slug catcher will go to the slop tank (FIN TK-09). Emissions from the condensate tanks (FINs TK-01 through TK-08), slop tank (FIN TK-09), and the produced water tank (FINs TK-10 through TK-18) will be routed to a VRU to be captured and controlled at a 100% efficiency. A second flare (FIN FL-2) serves as a back-up

during VRU downtime. As demonstrated in the calculations, assist gas is sent to all flares to ensure that the waste gas stream can sustain combustion. Flash off gas from the water knockout separator is recirculated to the compressor, and some condensate continues to the condensate pipeline for sales.

All Sugarkane CTB tanks are loaded out periodically by truck (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the VRU and the flare during downtime. The Site will also emit emissions due to equipment component leaks (FIN FUG) and small storage tanks for engine operation (FINs TK-AF, TK-LO, and TK-SCAV).

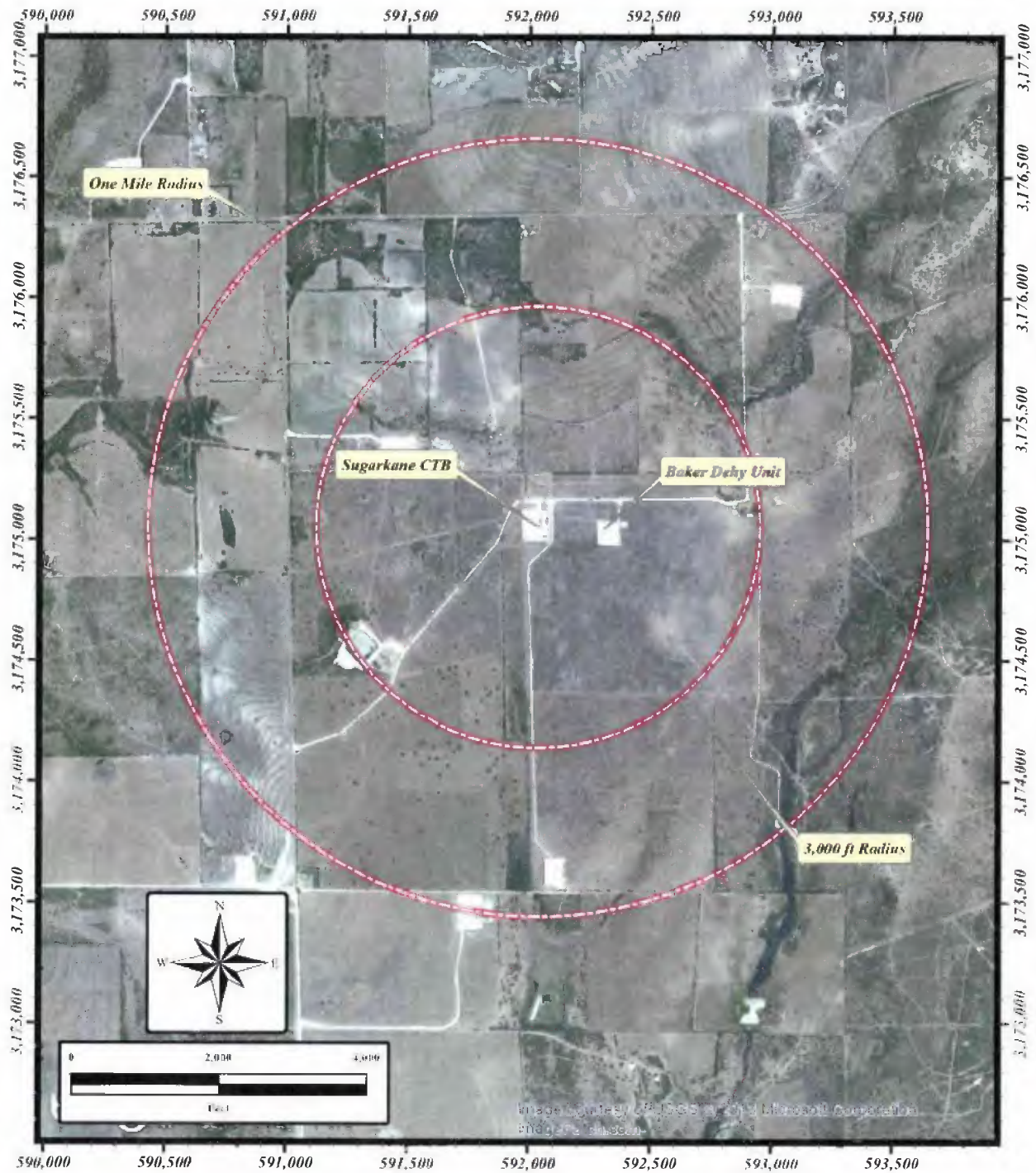
Scheduled Maintenance Startup and Shutdown Events

In accordance with TCEQ guidance and the non-rule Oil & Gas Standard Permit, a representation of planned Maintenance, Startup and Shutdown events are included in this Standard Permit registration in addition to the normal operating scenario.

It is conservatively planned that the VRU will be down for maintenance 8% of the year. During this time, any emissions from the liquids going to the storage tanks (FINs TK-01 through TK-18) and being loaded out via truck (FINs TRUCK1 and TRUCK2) would be controlled by the flare (FIN FL-2-SMSS).

Additionally, during engine operational adjustments, the volume of gas in the compressor units will blow down, resulting in emissions. This blowdown event (FINs COMP-01-BD and COMP-02-BD) are captured and routed to the flare (FIN FL-1-SMSS) and emissions are controlled at a 98% capture and combustion efficiency. As this engine is brought back online, starter vent (FINs COMP-01-SV and COMP-02-SV) emissions occur to atmosphere as natural gas is routed through the engine as it builds up pressure.

Attachment 3 contains emission rate calculations for the air emission sources and a summary of the Site's emission rates.



Grid Presented is UTM Zone 14, NAD 1983



TITAN Engineering, Inc.

2801 Network Boulevard, Suite 200
Frisco, Texas 75034

Phone: (469) 365-1100 Fax: (469) 365-1199

www.titanengineering.com & www.apexcos.com

A Division of Apex Companies, LLC

FIGURE 1-1 AREA MAP

Burlington Resources Oil & Gas Company LP

Standard Permit Registration

Sugarkane CTB - Baker Dehy Unit

TITAN Project No. 84800507-78

February 2013

from USGS Quadrangle Pawnee, Texas

Ground Condition Depicted October 2011

Digital Data Courtesy of ESRI Online Datasets



FIGURE 1-2 RECEPTOR MAP

**Burlington Resources Oil & Gas Company LP
Standard Permit Registration
Sugarkane CTB - Baker Dehy Unit
TITAN Project No. 84800507-78
February 2013**

*from USGS Quadrangle Pawnee, Texas
Ground Condition Depicted October 2011
Digital Data Courtesy of ESRI Online Datasets*



TITAN Engineering, Inc.

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A Division of Apex Companies, LLC

NOTES

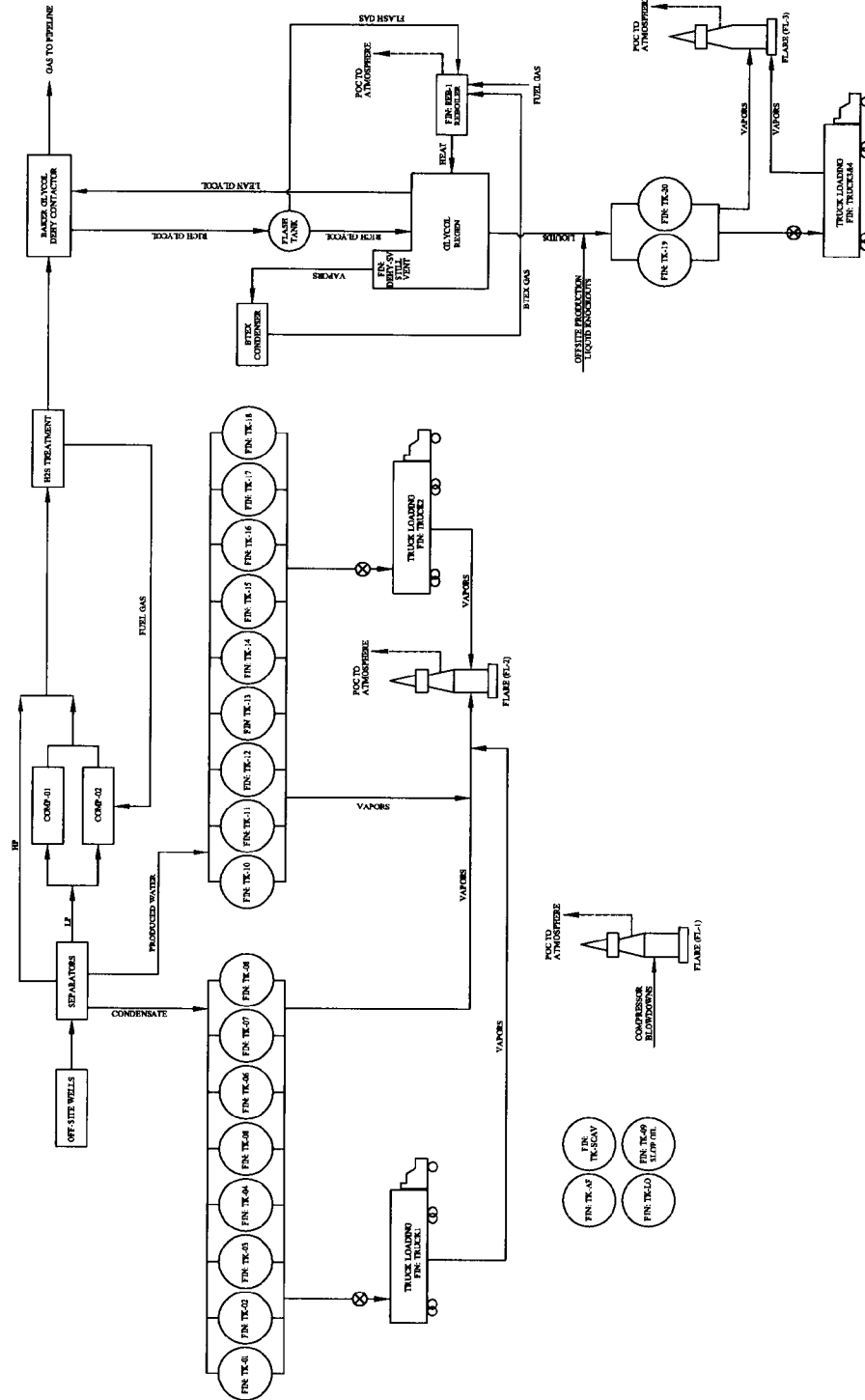


FIGURE 1-3
SIMPLIFIED PROCESS
FLOW DIAGRAM

Burlington Resources
Oil & Gas Company L.P.
Sugarkane CTB - Baker Dehy
Standard Permit Registration

DESIGNED BY: Burlington	DETAILED BY: LLA	CHECKED BY: CIC
FILE NAME: T:\ConocoPhillips\507-78\Sugarkane\Permit\CAD		
DATE: 03/2013	PROJECT NO.: 84800507-78	PLOT SCALE: NTS
DRAWING NO.: TEL-0000	REVISION: 0	FIGURE: 1-3

TITAN Engineering, Inc.
2811 1st Avenue, Suite 700
P.O. Box 4000, Tulsa, OK 74101
Phone: (918) 336-1100 • Fax: (918) 336-1199
www.titan-engineering.com
A Division of Alpine Companies, LLC

**ATTACHMENT 2
TCEQ FORMS AND TABLES**

OIL AND GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB – BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TITAN ENGINEERING, INC.
2801 NETWORK BLVD, SUITE 200
FRISCO, TX 75034

BANK OF TEXAS, NA
DALLAS, TX
32-1432/1110

25204

3/4/2013

PAY TO THE
ORDER OF **TCEQ**

\$ **850.00

Eight Hundred Fifty and 00/100*****

DOLLARS



Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

VOID AFTER 90 DAYS



Agency Fee: 84800507-78.001

⑈025204⑈ ⑆111014325⑆ ⑈8092671152⑈

TITAN ENGINEERING, INC.

25204

TCEQ

3/4/2013

Date	Type	Reference	Original Amt.	Balance Due	Discount	Payment
3/4/2013	Bill	84800507-78.001	850.00	850.00		850.00
				Check Amount		850.00

Bank of Texas Operati Agency Fee: 84800507-78.001

850.00

Texas Commission on Environmental Quality
OGS New Project Notification for New Registration

Site Information (Regulated Entity)

What is the name of the site to be authorized?	Sugarkane CTB - Baker Dehy Unit
Does the site have a physical address?	
County	LIVE OAK
Latitude (N) (##.#####)	28.699372
Longitude (W) (-###.#####)	-98.058222
Primary SIC Code	1311
Secondary SIC Code	
Primary NAICS Code	211111
Secondary NAICS Code	
Regulated Entity Site Information	
What is the Regulated Entity's Number (RN)?	RN105698112
What is the name of the Regulated Entity (RE)?	SUGARKANE CENTRAL BATTERY 1
Does the RE site have a physical address?	No
Because there is no physical address, describe how to locate this site:	FROM PAWNEE GO 1.0 MI N ON HWY 72 TO FM 882 GO APPROX 10.5 MI ON FM 882 TURN R ON LEASE RD GO APPROX 1.0 MI DOWN LEASE RD TO SITE
City	PAWNEE
State	TX
ZIP	78145
County	LIVE OAK
Latitude (N) (##.#####)	
Longitude (W) (-###.#####)	
What is the primary business of this entity?	NATURAL GAS PRODUCTION FACILITY

Burling-Customer (Applicant) Information

How is this applicant associated with this site?	Owner Operator
What is the applicant's Customer Number (CN)?	CN602989436
Type of Customer	Corporation
Full legal name of the applicant:	
Legal Name	Burlington Resources Oil & Gas Company LP
Texas SOS Filing Number	14500511

Federal Tax ID

State Franchise Tax ID 32003073841

DUNS Number 131117566

Number of Employees 501+

Independently Owned and Operated? Yes

I certify that the full legal name of the entity Yes

applying for this permit has been provided and
is legally authorized to do business in Texas.

Responsible Authority Contact

Organization Name Burlington Resources Oil & Gas Company LP

Prefix MR

First James

Middle

Last Woodall

Suffix

Title Sr. Environmental Specialist

Responsible Authority Mailing Address

Enter new address or copy one from list:

Address Type Domestic

Mailing Address (include Suite or Bldg. here, if
applicable) 600 N DAIRY ASHFORD RD

Routing (such as Mail Code, Dept., or Attn:) Westlake 3, 15012

City HOUSTON

State TX

ZIP 77079

Phone (###-###-####) 8324866508

Extension

Alternate Phone (###-###-####) 8324866508

Fax (###-###-####)

E-mail james.woodall@conocophillips.com

Responsible Official Contact

Person TCEQ should contact for questions
about this application:

Same as another contact? Burlington Resources Oil & Gas Company LP

Organization Name Burlington Resources Oil & Gas Company LP

Prefix MR

First Randy

Middle
Last Black

Suffix
Title Sr. Environmental Specialist
Enter new address or copy one from list: Burlington Resources Oil & Gas Company LP
Mailing Address
Address Type Domestic
Mailing Address (include Suite or Bldg. here, if applicable) 600 N DAIRY ASHFORD RD
Routing (such as Mail Code, Dept., or Attn:) Westlake 3, 15012
City HOUSTON
State TX
ZIP 77079
Phone (###-###-####) 8324866508
Extension
Alternate Phone (###-###-####) 8324866508
Fax (###-###-####)
E-mail randy.c.black@conocophillips.com

Technical Contact

Person TCEQ should contact for questions about this application:

Same as another contact? Burlington Resources Oil & Gas Company LP
Organization Name Burlington Resources Oil & Gas Company LP
Prefix MR
First James
Middle
Last Woodall
Suffix
Title Sr. Environmental Specialist
Enter new address or copy one from list: Burlington Resources Oil & Gas Company LP
Mailing Address
Address Type Domestic
Mailing Address (include Suite or Bldg. here, if applicable) 600 N DAIRY ASHFORD RD
Routing (such as Mail Code, Dept., or Attn:) Westlake 3, 15012
City HOUSTON
State TX

ZIP	77079
Phone (###-###-####)	8324866508
Extension	
Alternate Phone (###-###-####)	8324866508
Fax (###-###-####)	
E-mail	james.woodall@conocophillips.com

OGS New Project Notification

1) Select the authorization this site or changes to this site will most likely be authorized under based on expected worst-case operations (including planned MSS activities if MSS emissions are being registered with this project).	6002 - NON RULE 2012-NOV-08
2) What is the lease name submitted to the Railroad Commission (RRC)? If there are well(s) co-located with the site, include the well number(s) assigned by the RRC.	NA
3) Provide a brief process description for this site or description of changes to this site.	The site will collect hydrocarbon liquids from nearby wells. Low pressure gas will be sent to compression, routed to a dehydration unit and sent down the pipeline. Hydrocarbon liquids are collected and sent offsite periodically.
4) What is the site's latitude? (North)	28.699372
5) What is the site's longitude? (West)	-98.057822
6) What method was used to determine the site's latitude and longitude?	Map
7) Does this business qualify as a small business, non-profit organization, or small government entity?	No

Signature

The signature below indicates to the best of my knowledge that the information submitted is true and complete, and that I have signature authority to submit this application on behalf of the regulated entity.

1. I am James Woodall, the owner of the STEERS account ER020324.
2. I have the authority to sign this data on behalf of the applicant named above.
3. I have personally examined the foregoing and am familiar with its content and the content of any attachments, and based upon my personal knowledge and/or inquiry of any individual responsible for information contained herein, that this information is true, accurate, and complete.
4. I further certify that I have not violated any term in my TCEQ STEERS participation agreement and that I have no reason to believe that the confidentiality or use of my password has been compromised at any time.

5. I understand that use of my password constitutes an electronic signature legally equivalent to my written signature.
6. I also understand that the attestations of fact contained herein pertain to the implementation, oversight and enforcement of a state and/or federal environmental program and must be true and complete to the best of my knowledge.
7. I am aware that criminal penalties may be imposed for statements or omissions that I know or have reason to believe are untrue or misleading.
8. I am knowingly and intentionally signing OGS New Project Notification for New Registration.
9. My signature indicates that I am in agreement with the information on this form, and authorize its submittal to the TCEQ.

OWNER OPERATOR Signature: James Woodall OWNER OPERATOR

Account Number: ER020324
Signature IP Address: 138.32.80.20
Signature Date: 2013-02-08
Signature Hash: AA06BD67D3B72ED49336BE1B65B794CDB78BFA0ECB7C0D5E82BDCEE54CEC562C
Form Hash Code at time of Signature: 71DC2B12E9B33922429868A7B91AEA01BCF588C08F2AA84592EFCF690AF1441B

Fee Payment

Transaction by: The application fee payment transaction was made by ER025071/Christina I Chermak
Paid by: The application fee was paid by CHRISTINA CHERMAK
Fee Amount: \$50.00
Paid Date: The application fee was paid on 2013-02-08
Transaction/Voucher number: The transaction number is 582EA000135659 and the voucher number is 171262

Submission

Reference Number: The application reference number is 60183
Submitted by: The application was submitted by ER025071/Christina I Chermak
Submitted Timestamp: The application was submitted on 2013-02-08 at 10:27:19 CST
Submitted From: The application was submitted from IP address 12.237.12.100
Confirmation Number: The confirmation number is 64090
Steers Version: The STEERS version is 5.87

Additional Information

2/8/13

Copy of Record

Application Creator: This account was created by Christina I Chermak



Texas Commission on Environmental Quality
Table 29 Reciprocating Engines

I. Engine Data											
Manufacturer: Caterpillar		Model No. G3508TALE		Serial No. 411498		Manufacture Date: 9/12/2008					
Rebuilds Date: NA		No. of Cylinders: 16		Compression Ratio: 8:1		EPN: COMP-01					
Application: <input checked="" type="checkbox"/> Gas Compression <input type="checkbox"/> Electric Generation <input type="checkbox"/> Refrigeration <input type="checkbox"/> Emergency/Stand by											
<input checked="" type="checkbox"/> 4 Stroke Cycle <input type="checkbox"/> 2 Stroke Cycle <input checked="" type="checkbox"/> Carbureted <input checked="" type="checkbox"/> Spark Ignited <input type="checkbox"/> Dual Fuel <input type="checkbox"/> Fuel Injected											
<input type="checkbox"/> Diesel <input type="checkbox"/> Naturally Aspirated <input type="checkbox"/> Blower /Pump Scavenged <input checked="" type="checkbox"/> Turbo Charged and I.C. <input checked="" type="checkbox"/> Turbo Charged											
<input type="checkbox"/> Intercooled <input type="checkbox"/> I.C. Water Temperature <input checked="" type="checkbox"/> Lean Burn <input type="checkbox"/> Rich Burn											
Ignition/Injection Timing: Fixed: _____ Variable: _____											
Manufacture Horsepower Rating: 670						Proposed Horsepower Rating: 502-670					
Discharge Parameters											
Stack Height (Feet)		Stack Diameter (Feet)		Stack Temperature (°F)		Exit Velocity (FPS)					
20		1.0		985		86.71					
II. Fuel Data											
Type of Fuel: <input checked="" type="checkbox"/> Field Gas <input type="checkbox"/> Landfill Gas <input type="checkbox"/> LP Gas <input type="checkbox"/> Natural Gas <input type="checkbox"/> Digester Gas <input type="checkbox"/> Diesel											
Fuel Consumption (BTU/bhp-hr): 7510				Heat Value: (HHV)				(LHV)			
Sulfur Content (grains/100 scf - weight %): 10 ppm											
III. Emission Factors (Before Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM10	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv
Source of Emission Factors: <input type="checkbox"/> Manufacturer Data <input type="checkbox"/> AP-42 <input type="checkbox"/> Other (specify): _____											
IV. Emission Factors (Post Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM10	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv
2.0		3.0				1.0					
Method of Emission Control: <input type="checkbox"/> NSCR Catalyst <input checked="" type="checkbox"/> Lean Operation <input type="checkbox"/> Parameter Adjustment											
<input type="checkbox"/> Stratified Charge <input type="checkbox"/> JLCC Catalyst <input checked="" type="checkbox"/> Other (Specify): SCR Catalvst											
<i>Note: Must submit a copy of any manufacturer control information that demonstrates control efficiency.</i>											
Is Formaldehyde included in the VOCs?										<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
V. Federal and State Standards (Check all that apply)											
<input checked="" type="checkbox"/> NSPS JJJJ <input checked="" type="checkbox"/> MACT ZZZZ <input type="checkbox"/> NSPS IIII <input type="checkbox"/> Title 30 Chapter 117 - List County: _____											
VI. Additional Information											
1. Submit a copy of the engine manufacturer's site rating or general rating specification data.											
2. Submit a typical fuel gas analysis, including sulfur content and heating value. For gaseous fuels, provide mole percent of constituents.											
3. Submit description of air/fuel ratio control system (manufacturer information is acceptable).											



Texas Commission on Environmental Quality
Table 29 Reciprocating Engines

I. Engine Data											
Manufacturer: Caterpillar		Model No. G3508 TALE		Serial No. 410776		Manufacture Date: 1/15/2004					
Rebuilds Date: NA		No. of Cylinders: 16		Compression Ratio: 8:1		EPN: COMP-02					
Application: <input checked="" type="checkbox"/> Gas Compression <input type="checkbox"/> Electric Generation <input type="checkbox"/> Refrigeration <input type="checkbox"/> Emergency/Stand by											
<input checked="" type="checkbox"/> 4 Stroke Cycle <input type="checkbox"/> 2 Stroke Cycle <input checked="" type="checkbox"/> Carbureted <input checked="" type="checkbox"/> Spark Ignited <input type="checkbox"/> Dual Fuel <input type="checkbox"/> Fuel Injected											
<input type="checkbox"/> Diesel <input type="checkbox"/> Naturally Aspirated <input type="checkbox"/> Blower /Pump Scavenged <input checked="" type="checkbox"/> Turbo Charged and I.C. <input checked="" type="checkbox"/> Turbo Charged											
<input type="checkbox"/> Intercooled <input type="checkbox"/> I.C. Water Temperature <input checked="" type="checkbox"/> Lean Burn <input type="checkbox"/> Rich Burn											
Ignition/Injection Timing: Fixed: _____ Variable: _____											
Manufacture Horsepower Rating: 630						Proposed Horsepower Rating: 473-630					
Discharge Parameters											
Stack Height (Feet)		Stack Diameter (Feet)		Stack Temperature (°F)		Exit Velocity (FPS)					
20		1.0		856		73.95					
II. Fuel Data											
Type of Fuel: <input checked="" type="checkbox"/> Field Gas <input type="checkbox"/> Landfill Gas <input type="checkbox"/> LP Gas <input type="checkbox"/> Natural Gas <input type="checkbox"/> Digester Gas <input type="checkbox"/> Diesel											
Fuel Consumption (BTU/bhp-hr): 7820				Heat Value: (HHV)				(LHV)			
Sulfur Content (grains/100 scf - weight %): 10 ppm											
III. Emission Factors (Before Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM10	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv
2.0		3.0				1.0		0.42			
Source of Emission Factors: <input checked="" type="checkbox"/> Manufacturer Data <input type="checkbox"/> AP-42 <input type="checkbox"/> Other (specify): _____											
IV. Emission Factors (Post Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM10	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv
Method of Emission Control: <input type="checkbox"/> NSCR Catalyst <input checked="" type="checkbox"/> Lean Operation <input type="checkbox"/> Parameter Adjustment											
<input type="checkbox"/> Stratified Charge <input type="checkbox"/> JLCC Catalyst <input checked="" type="checkbox"/> Other (Specify): <u>Air-Fuel Ratio Control</u>											
<i>Note: Must submit a copy of any manufacturer control information that demonstrates control efficiency.</i>											
Is Formaldehyde included in the VOCs?										<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
V. Federal and State Standards (Check all that apply)											
<input type="checkbox"/> NSPS JJJJ <input checked="" type="checkbox"/> MACT ZZZZ <input type="checkbox"/> NSPS IIII <input type="checkbox"/> Title 30 Chapter 117 - List County: _____											
VI. Additional Information											
1. Submit a copy of the engine manufacturer's site rating or general rating specification data.											
2. Submit a typical fuel gas analysis, including sulfur content and heating value. For gaseous fuels, provide mole percent of constituents.											
3. Submit description of air/fuel ratio control system (manufacturer information is acceptable).											



Permit Number:	108166	RN Number:	RN105698112	Date:	February 2013
Company Name:	Burlington Resources Oil & Gas Company LP - SUGARKANE CTB - BAKER DEHY UNIT				

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA										EMISSION POINT DISCHARGE PARAMETERS									
1. Emission Point			2. Component or Air Contaminant		3. Air Contaminant Emission Rate		4. UTM Coordinates of Emission Point			5. Building Height		6. Height Above Ground		7. Stack Exit Data		8. Fugitives			
EPN (A)	FIN (B)	NAME (C)	Name	Pounds per Hour (A)	TPV (B)	Zone	East (meters)	North (meters)	Building Height (ft)	Height Above Ground (ft)	Diameter (ft) (A)	Velocity (ft/s) (B)	Temperature (°F) (C)	Length (ft) (A)	Width (ft) (B)	Axis Degrees (C)			
Normal Operations																			
COMP-01		Compressor Engine 1	CO	4.43	19.40	14	--	--	--	20.0	1.0	86.71	985.0	--	--	--			
			NOx	2.95	12.92														
			PM/PM ₁₀ /PM _{2.5}	0.05	0.22														
			SO ₂	0.01	0.04														
			VOC	1.48	6.48														
COMP-02		Compressor Engine 2	CH ₂ O	0.27	1.18														
			Benzene	0.01	0.04														
			CO	4.17	18.26	14	--	--	--	20.0	1.0	73.95	856.0	--	--	--			
			NOx	2.78	12.18														
			PM/PM ₁₀ /PM _{2.5}	0.004	0.02														
FUG		Site Fugitives	SO ₂	0.001	0.004														
			VOC	1.39	6.09														
			CH ₂ O	0.58	2.54														
			Benzene	0.006	0.03														
			VOC	2.00	8.79	14	--	--	--	3.0	--	--	--	--	--	--			
REB-1		Glycol Reboiler No. 1	Benzene	0.02	0.09														
			H ₂ S	0.001	0.004														
			CO	0.04	0.18	14	--	--	--	14.3	--	--	--	--	--	--			
			NOx	0.05	0.22														
			PM/PM ₁₀ /PM _{2.5}	0.004	0.02														
TK-19		Condensate Storage Tank at Baker	SO ₂	0.001	0.004														
			VOC	0.003	0.01														
			Benzene	0.000001	0.000004														
			CH ₂ O	0.000004	0.0002														
			VOC	0.78	3.41	14	--	--	--	14.3	--	--	--	--	--	--			
FL-3		Produced Water Storage Tank at Baker	Benzene	0.04	0.00														
			H ₂ S	0.0002	0.001														
			VOC	0.005	0.01	14	--	--	--	25.0	--	--	--	--	--	--			
			Benzene	0.0002	0.001														
			H ₂ S	0.00001	0.00004														
TK-20		Amifreeze Liquid Storage	VOC	0.04	0.00	14	--	--	--	25.0	--	--	--	--	--	--			
			Benzene	0.0002	0.001														
			H ₂ S	0.00001	0.00004														
			VOC	0.50	0.01	14	--	--	--	--	--	--	--	--	--				
			Benzene	0.0002	0.00002	14	--	--	--	--	--	--	--	--	--				
TK-AF		Lube Oil Liquid Storage	VOC	<0.01	<0.01	14	--	--	--	--	--	--	--	--	--	--			
			Benzene	0.63	0.47	14	--	--	--	25.0	--	--	--	--	--				
			H ₂ S	0.003	0.002														
			VOC	0.01	0.002	14	--	--	--	25.0	--	--	--	--	--				
			Benzene	0.0001	0.00001														
TRUCK2		Controlled Produced Water Tank Truck Loading (Sugar Kane)	VOC	0.01	0.002	14	--	--	--	25.0	--	--	--	--	--	--			
			Benzene	0.0001	0.00001														
			CO	0.04	0.18	14	--	--	--	14.3	--	--	--	--	--				
			NOx	0.05	0.22														
			PM/PM ₁₀ /PM _{2.5}	0.004	0.02														



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emissions Point Summary

Permit Number:	108166	RN Number:	RN105698112	Date:	February 2013
Company Name:	Burlington Resources Oil & Gas Company LP - SUGARKANE CTB - BAKER DEHY UNIT				

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA				EMISSION POINT DISCHARGE PARAMETERS													
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate		4. UTM Coordinates of Emission Point			5. Building Height (ft)	6. Height Above Ground (ft)	7. Stack Exit Data			8. Fugitive			
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)	Zone	East (meters)	North (meters)			Diameter (ft) (A)	Velocity (ft/sec) (B)	Temperature (°F) (C)	Length (ft) (A)	Width (ft) (B)	Aside Degrees (C)	
FL-3	TRUCK3	Controlled Condensate Tank Truck Loading (Baker)	VOC	1.58	0.72	14	--	--	--	--	--	--	--	--	--	--	
FL-3	TRUCK4	Controlled Produced Water Tank Truck Loading (Baker)	VOC	0.01	0.003	14	--	--	--	30.0	--	--	--	--	--	--	
FL-1	FL-1	Flare 1 Combustion (assist, and pilot)	Benzene	0.0001	0.0001	14	--	--	--	30.0	--	--	--	--	--	--	
			CO	0.45	1.97	14	--	--	--	30.0	--	--	--	--	--	--	
			NO _x	0.22	0.97												
			SO ₂	0.03	0.13												
			H ₂ S	0.00001	0.00004												
			VOC	0.01	0.04												
			Benzene	0.000003	0.00001												
FL-2	FL-2	Flare 2 Combustion (assist, and pilot)	CO	0.45	1.97	14	--	--	--	30.0	--	--	--	--	--	--	
			NO _x	0.22	0.97												
			SO ₂	0.03	0.13												
			H ₂ S	0.00001	0.00004												
			VOC	0.01	0.04												
			Benzene	0.000003	0.00001												
FL-3	FL-3	Flare 3 Combustion (normal operations waste gas, assist, and pilot)	CO	1.62	4.70	14	--	--	--	30.0	--	--	--	--	--	--	
			NO _x	0.81	2.34												
			SO ₂	0.04	0.15												
			H ₂ S	0.0001	0.0002												
			VOC	0.01	0.04												
			Benzene	0.000003	0.00001												
Scheduled Maintenance Startup and Shutdown Events																	
COMP-01-SV	COMP-01-SV	Compressor Engine 1 Starter Vent	VOC	16.88	0.44	14	--	--	--	20.0	--	--	--	--	--	--	
			Benzene	0.07	0.002												
			H ₂ S	0.02	0.0004												
FL-1-SMSS	COMP-01-BD	Compressor Engine 1 Blowdown	VOC	0.26	0.01	14	--	--	--	30.0	--	--	--	--	--	--	
			Benzene	0.001	0.00002												
			H ₂ S	0.0002	0.00001												
COMP-02-SV	COMP-02-SV	Compressor Engine 2 Starter Vent	VOC	16.88	0.44	14	--	--	--	20.0	--	--	--	--	--	--	
			Benzene	0.07	0.002												
			H ₂ S	0.02	0.02												
FL-1-SMSS	COMP-02-BD	Compressor Engine 2 Blowdown	VOC	0.24	0.01	14	--	--	--	30.0	--	--	--	--	--	--	
			Benzene	0.001	0.00002												
			H ₂ S	0.0002	0.00001												
FL-2-SMSS	TK-01 through TK-08	Controlled Condensate Tanks Emissions (during VRU downtime)	VOC	2.14	1.10	14	--	--	--	30.0	--	--	--	--	--	--	
			Benzene	0.01	0.004												
			H ₂ S	0.0004	0.0002												
FL-2-SMSS	TK-09	Controlled Strip Tank Emissions (during VRU downtime)	VOC	0.18	0.05	14	--	--	--	30.0	--	--	--	--	--	--	
			Benzene	0.001	0.0002												

TC EQ-10153 (Revised 01-15-03)
Table 1(a) - Emission Point Summary - These forms are for use by sources subject to the
New Source Review Program and may be revised [ANSR09/A7026.v2]



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emissions Point Summary

Permit Number:	108166	RN Number:	RN105698112	Date:	February 2013
Company Name:	Burlington Resources Oil & Gas Company LP - SUGARKANE CTB - BAKER DEHY UNIT				

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA										EMISSION POINT DISCHARGE PARAMETERS									
1. Emission Point				2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate		4. UTM Coordinates of Emission Point			5. Building Height (ft)	6. Height Above Ground (ft)	7. Stack Exit Data			8. Source				
EPN (A)	FIN (B)	NAME (C)	Pounds per Hour (A)		TPV (B)	Zone	East (meters)	North (meters)	Diameter (ft) (A)			Velocity (ft/s) (B)	Temperature (°F) (C)	Length (ft) (A)	Width (ft) (B)	Asix Degrees (C)			
FL-2-SM65	TK-10 through TK-18	Controlled Produced Water Tank Emissions (during VRU downtime)	VOC	0.08	0.03	14	--	--	--	--	30.0	--	--	--	--	--			
			Benzene	0.0002	0.0001														
			H ₂ S	0.00002	0.00001														
FL-2-SM65	TRUCK1	Controlled Condensate and Slop Tank Truck Loading at Sugarlane (during VRU downtime)	VOC	1.58	0.09	14	--	--	--	--	30.0	--	--	--	--	--			
			Benzene	0.01	0.0004														
FL-2-SM65	TRUCK2	Controlled Produced Water Tank Truck Loading at Sugarlane (during VRU downtime)	VOC	0.02	0.0004	14	--	--	--	--	30.0	--	--	--	--	--			
			Benzene	0.0001	0.000002														
FL-1-SM65	FL-1-SM65	Flare 1 Combustion (Engine blowdown waste gas)	CO	0.48	0.01	14	--	--	--	--	30.0	--	--	--	--	--			
			NO _x	0.24	0.01														
			SO ₂	0.04	0.001														
			H ₂ S	0.000	0.00001														
FL-2-SM65	FL-2-SM65	Flare 2 Combustion (Tank waste gas during VRU downtime)	CO	1.59	0.58	14	--	--	--	--	30.0	--	--	--	--	--			
			NO _x	0.80	0.30														
			SO ₂	0.04	0.02														
			H ₂ S	0.0004	0.0002														

TCEQ-1013 (Revised 01-15-03)
Table 1(a) - Emission Point Summary - These forms are for use by sources subject to the New Source Review Program and may be revised (ANSR09SA7026 v2)

ATTACHMENT 3
EMISSION RATE CALCULATIONS
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB – BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

TABLE 3-1
SUMMARY OF PROPOSED ALLOWABLE EMISSION RATES
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTR - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	Proposed Allowable Hourly and Annual Emission Rates															
			VOC		NO _x		CO		PM/PM ₁₀ /PM _{2.5}		SO ₂		H ₂ S		CH ₄ O		Benzene	
			(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Normal Operations	COMP-01	Compressor Engine 1	1.48	6.48	2.95	12.92	4.43	19.40	0.05	0.22	6.01	0.04	--	--	0.27	1.18	0.01	0.04
	COMP-02	Compressor Engine 2	1.39	6.09	2.78	12.18	4.17	18.26	0.05	0.22	6.01	0.04	--	--	0.58	2.54	0.006	0.03
	FUG	Site Fugitives	2.00	8.79	--	--	--	--	--	--	--	--	0.001	0.004	--	--	0.09	0.09
	REB-1	Glycol Reboiler No. 1	0.003	0.01	0.05	0.22	0.04	0.18	0.004	0.02	0.001	0.004	--	--	0.00004	0.00002	0.000001	0.000004
	DEHY-SV	Glycol Dehy Still Vent	0.78	3.41	--	--	--	--	--	--	--	--	0.01	0.05	--	--	0.04	0.17
	FL-3	Condensate Storage Tank at Baker	1.47	5.15	--	--	--	--	--	--	--	--	0.0002	0.001	--	--	0.005	0.01
	TK-19	Produced Water Storage Tank at Baker	0.04	0.17	--	--	--	--	--	--	--	--	0.00001	0.00004	--	--	0.001	0.001
	FL-3	Produced Water Storage Tank at Baker	0.04	0.17	--	--	--	--	--	--	--	--	0.0002	0.001	--	--	0.005	0.01
	TK-AF	Antifreeze Liquid Storage	0.50	0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TK-LO	Lube Oil Liquid Storage	0.0002	0.000002	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TK-SCAV	H ₂ S Scavenger Liquid Storage	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	VRU	Controlled Condensate and Slop Tank Truck Loading (Sugarkane)	0.63	0.47	--	--	--	--	--	--	--	--	--	--	--	--	0.003	0.002
	TRUCK1	Controlled Produced Water Tank Truck Loading (Sugarkane)	0.01	0.002	--	--	--	--	--	--	--	--	--	--	--	--	0.001	0.00001
VRU	Controlled Condensate Tank Truck Loading (Baker)	1.58	0.72	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.003	
FL-3	Controlled Condensate Tank Truck Loading (Baker)	0.02	0.003	--	--	--	--	--	--	--	--	--	--	--	--	0.001	0.0001	
FL-1	Flare 1 Combustion (assist, and pilot)	0.01	0.04	0.22	0.97	0.45	1.97	--	--	0.03	0.13	0.00001	0.00004	--	--	0.000003	0.00001	
FL-2	Flare 2 Combustion (assist, and pilot)	0.01	0.04	0.22	0.97	0.45	1.97	--	--	0.03	0.13	0.00001	0.00004	--	--	0.000003	0.00001	
FL-3	Flare 3 Combustion (normal operations waste gas, assist, and pilot)	0.01	0.04	0.81	2.34	1.62	4.70	--	--	0.04	0.15	0.0001	0.0002	--	--	0.000003	0.00001	
Scheduled Maintenance, Startup and Shutdown Events																		
COMP-01-SV	COMP-01-SV	Compressor Engine 1 Starter Vent	16.88	0.44	--	--	--	--	--	--	--	--	0.02	0.0004	--	--	0.07	0.002
FL-1-SMSS	COMP-01-BD	Compressor Engine 1 Blowdown	0.26	0.01	--	--	--	--	--	--	--	--	0.0002	0.00001	--	--	0.001	0.00002
COMP-02-SV	COMP-02-SV	Compressor Engine 2 Starter Vent	16.88	0.44	--	--	--	--	--	--	--	--	0.02	0.02	--	--	0.07	0.002
FL-1-SMSS	COMP-02-BD	Compressor Engine 2 Blowdown	0.24	0.01	--	--	--	--	--	--	--	--	0.0002	0.00001	--	--	0.001	0.00002
TK-01 through TK-08	TK-01 through TK-08	Controlled Condensate Tanks Emissions (during VRU downtime)	2.14	1.10	--	--	--	--	--	--	--	--	0.0004	0.0002	--	--	0.01	0.004
FL-2-SMSS	TK-09	Controlled Slop Tank Emissions (during VRU downtime)	0.18	0.05	--	--	--	--	--	--	--	--	--	--	--	--	0.001	0.0002
FL-2-SMSS	TK-10 through TK-18	Controlled Produced Water Tank Emissions (during VRU downtime)	0.08	0.03	--	--	--	--	--	--	--	--	0.00002	0.00001	--	--	0.0002	0.0001
FL-2-SMSS	TRUCK1	Controlled Condensate and Slop Tank Truck Loading at Sugarkane (during VRU downtime)	1.58	0.09	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.0004
FL-2-SMSS	TRUCK2	Controlled Produced Water Tank Truck Loading at Sugarkane (during VRU downtime)	0.02	0.0004	--	--	--	--	--	--	--	--	--	--	--	--	0.0001	0.000002
FL-1-SMSS	FL-1-SMSS	Flare 1 Combustion (Engine blowdown waste gas)	--	--	0.24	0.01	0.48	0.01	--	--	0.04	0.001	0.0004	0.00001	--	--	--	--
FL-2-SMSS	FL-2-SMSS	Flare 2 Combustion (Tank waste gas during VRU downtime)	--	--	0.80	0.30	1.59	0.58	--	--	0.04	0.02	0.0004	0.0002	--	--	--	--
Site-Wide Emissions:			48.19	33.60	8.87	29.91	13.23	47.07	0.10	0.46	0.20	0.52	0.05	0.08	0.85	3.72	0.26	0.35

**CALCULATION OF COMPRESSOR ENGINE POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

EPN	FIN	Description	Type	Engine Ratings		Annual Operating Hours (hr/yr)	Emission Factor ^a (lb/hr)	Potential to Emit (PTE)	
				Rated Horsepower (hp)	Fuel Consumption (Btu/lb-hr)			Hourly ^a (lb/hr)	Annual ^b (T/yr)
COMP-01	COMP-01	Compressor Engine 1 Lean Burn SCR Catalyst	Caterpillar G3508TALE Lean Burn SCR Catalyst	670	7.656	8,760	CO	3.00	4.43
							NO _x	2.00	2.95
							PM/PM ₁₀ /PM _{2.5}	0.0099871	0.05
							SO ₂	10	0.01
							VOC	1.00	1.48
COMP-02	COMP-02	Compressor Engine 2	Caterpillar G3508LE Lean Burn	630	7.693	8,760	CH ₄ O	0.0328	0.27
							Benzene ^c	0.004	0.01
							CO	3.00	4.17
							NO _x	2.00	2.78
							PM/PM ₁₀ /PM _{2.5}	0.0099871	0.05
							SO ₂	10	0.01
							VOC	1.00	1.39
							CH ₄ O	0.42	0.58
							Benzene ^c	0.004	0.006
									0.03

^a The Emission Factors for engine COMP-01 and COMP-02 for CO, NO_x and VOC are based on vendor data and conservatively represented based on the applicable rules. The VOC emission factor is added with the Q_{emission} factor from AP-42 because the vendor provided information does not include formaldehyde. An example calculation for hourly CO emissions for EPN COMP-01 follows:

$$CO \text{ (lb/hr)} = (\text{Rated Horsepower, hp}) \times (\text{Emission Factor, g/lb-hr}) \times (1 \text{ lb} / 453.59 \text{ g})$$

$$CO \text{ (lb/hr)} = (670 \text{ hp}) \times (3.00 \text{ g/lb-hr}) \times (1 \text{ lb} / 453.59 \text{ g})$$

$$= 4.43 \text{ lb/hr CO}$$

The PM₁₀, PM_{2.5} and CH₄O Emission Factors for EPN COMP-01 and COMP-02 are from AP-42 Table 3.2-2 for Four-Stroke Lean Burn Engines (dated 7/00). An example calculation for hourly PM emissions for EPN COMP-01 follows:

$$PM \text{ (lb/hr)} = (\text{Fuel Consumption, Btu/lb-hr}) \times (\text{Rated Horsepower, hp}) \times (1 \text{ MM Btu} / 10^6 \text{ Btu}) \times (0.0099871 \text{ lb/MM Btu})$$

$$PM \text{ (lb/hr)} = (7.656 \text{ Btu/lb-hr}) \times (670 \text{ hp}) \times (1 \text{ MM Btu} / 10^6 \text{ Btu}) \times (0.0099871 \text{ lb/MM Btu})$$

$$= 0.05 \text{ lb/hr PM}$$

A material balance approach was used to estimate the SO₂ emission rates using the maximum sulfur concentration in the natural gas. If Sulfenator liquids are used to bring the fuel gas H₂S concentration below 10 ppm S. An example calculation for hourly SO₂ emissions for EPN COMP-01 follows:

$$SO_2 \text{ (lb/hr)} = (\text{Fuel Consumption, Btu/lb-hr}) \times (\text{Rated Horsepower, hp}) \times (\text{Lower Fuel Heating Value, Btu/scf}) \times (1 \text{ lb-mol} / 379 \text{ scf}) \times (32.06 \text{ lb S} / \text{lb-mol}) \times (64.06 \text{ lb SO}_2 / 32.06 \text{ lb S})$$

$$SO_2 \text{ (lb/hr)} = (7.510 \text{ Btu/lb-hr}) \times (670 \text{ hp}) \times (1.335 \text{ Btu/scf}) \times (10 \text{ scf S} / 10^6 \text{ scf gas}) \times (1 \text{ lb-mol} / 379 \text{ scf}) \times (32.06 \text{ lb S} / \text{lb-mol}) \times (64.06 \text{ lb SO}_2 / 32.06 \text{ lb S})$$

$$= 0.01 \text{ lb/hr SO}_2$$

^b An example calculation for annual CO emissions for EPN COMP-01 follows:

$$CO \text{ (T/yr)} = (\text{Hourly PTE, lb/hr}) \times (\text{Annual Operating Hours, hr/yr}) \times (1 \text{ T} / 2,000 \text{ lb})$$

$$CO \text{ (T/yr)} = (4.43 \text{ lb/hr}) \times (8,760 \text{ hr/yr}) \times (1 \text{ T} / 2,000 \text{ lb})$$

$$= 19.40 \text{ T/yr CO}$$

^c An example calculation for benzene emission factor (EF) for EPN COMP-01 follows:

$$\text{Benzene EF (g/lb-hr)} = (\text{VOC emission factor, g/lb-hr}) \times (\text{Benzene AP-42 Emission Factor, lb/MM Btu}) / (\text{VOC AP-42 Emission Factor, lb/MM Btu})$$

$$\text{Benzene EF (g/lb-hr)} = (1.00) \times (0.00044 \text{ lb/MM Btu}) / (0.118 \text{ lb/MM Btu})$$

$$= 0.004 \text{ g/lb-hr}$$

CALCULATION OF SITE FUGITIVES (FIN FUG) POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Component	Number of Components	Emission Factors ^a (lb/hr-component)	Annual Operating Hours (hr/yr)	Maximum VOC ^a (wt%)	Maximum Benzene ^a (wt%)	Maximum H ₂ S ^a (wt%)	Reduction Credit ^a (%)	PTE VOC		PTE Benzene		PTE H ₂ S	
								Hourly ^b (lb/hr)	Annual ^c (T/yr)	Hourly ^b (lb/hr)	Annual ^c (T/yr)	Hourly ^b (lb/hr)	Annual ^c (T/yr)
Valves													
Gas Streams	256	0.00992	8,760	30%	0.43%	0.03%	0%	0.76	3.34	0.01	0.05	0.001	0.003
Light Oil	142	0.0055	8,760	100%	0.45%	--	0%	0.78	3.42	0.004	0.02	--	--
Water/Light Oil	108	0.000216	8,760	--	0.20%	--	0%	0.02	0.10	0.00005	0.0002	--	--
Pumps													
Water/Light Oil	10	0.000052	8,760	--	0.20%	--	0%	0.001	0.002	0.000001	0.000005	--	--
Compressors													
Gas Streams	8	0.0194	8,760	30%	0.43%	0.03%	0%	0.05	0.20	0.001	0.003	0.00005	0.0002
Flanges													
Gas Streams	228	0.00086	8,760	30%	0.43%	0.03%	0%	0.06	0.26	0.001	0.004	0.0001	0.0003
Light Oil	58	0.000243	8,760	100%	0.45%	--	0%	0.01	0.06	0.0001	0.0003	--	--
Water/Light Oil	20	0.000006	8,760	--	0.20%	--	0%	0.0001	0.001	0.0000002	0.000001	--	--
Connectors													
Gas Streams	556	0.00044	8,760	30%	0.43%	0.03%	0%	0.07	0.32	0.001	0.005	0.0001	0.0003
Light Oil	408	0.000463	8,760	100%	0.45%	--	0%	0.19	0.83	0.001	0.004	--	--
Water/Light Oil	248	0.000243	8,760	--	0.20%	--	0%	0.06	0.26	0.0001	0.001	--	--
TOTAL:								2.00	8.79	0.02	0.09	0.001	0.004

^a Fugitive Emission Factors and Reduction Credits are per TCEQ Technical Guidance Document for Equipment Leak Fugitives, dated October 2000. The emission factors are for total hydrocarbon, except for the emission factors associated with Water/Light Oil. As indicated on page 6 of 55 in the mentioned Guidance document, these factors are based off of a known stream constituency of 50%-99% water, and remainder VOC. Therefore, applying a VOC wt % would be double counting for the reduction due to water.

^b Hourly VOC emission rates are calculated as follows:

(256 components) * (0.00992 lb/hr-component) * (30% VOC) * (100% - 0% reduction credit) = 0.76 lb/hr

^c Annual VOC emission rates are calculated as follows:

(256 components) * (0.00992 lb/hr-component) * (8,760 hr/yr) * (30% VOC) * (100% - 0% reduction credit) / (2,000 lb/T) = 3.34 T/yr

**CALCULATION OF HEATERS POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

EPN	FIN	Description	Rated Duty (MMBtu/hr)	Operating Annual (hr/yr)	Pollutant	Emission Factor ^a	Unit	Potential To Emit ^b	
								Hourly (lb/hr)	Annual (T/yr)
REB-1	REB-1	Glycol Reboiler No. 1	0.50	8,760	CO	84	lb/MMscf	0.04	0.18
					NO _x	100	lb/MMscf	0.05	0.22
					PM/PM ₁₀ /PM _{2.5} ^d	7.6	lb/MMscf	0.004	0.02
					SO ₂ ^e	10.0	ppm H2S	0.001	0.004
					VOC	5.5	lb/MMscf	0.003	0.01
					Benzene	0.002	lb/MMscf	0.000001	0.000004
					CH ₄ O	0.075	lb/MMscf	0.00004	0.0002

^a Unless otherwise noted, emission factors are from AP-42 Tables 1.4-1, 1.4-2, and 1.4-3 (dated 7/98) and are based on a fuel HHV of 1020 Btu/scf.

^b Example calculations for EPN REB-1 follows:

$$\text{CO (lb/hr)} = (\text{Rated Duty, MMBtu/hr}) / (\text{Higher Heating Value, Btu/scf}) * (\text{Emission Factor, lb/MMscf})$$

$$\text{CO (lb/hr)} = (0.50 \text{ MMBtu/hr}) / (1020 \text{ Btu/scf}) * (84 \text{ lb/MMscf})$$

$$= \boxed{0.04} \text{ lb/hr CO}$$

$$\text{CO (T/yr)} = (\text{Hourly Emissions, lb/hr}) * (\text{Annual Operating Hours, hr/yr}) / (2,000 \text{ lb/T})$$

$$\text{CO (T/yr)} = (0.04 \text{ lb/hr}) * (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$$

$$= \boxed{0.18} \text{ T/yr CO}$$

^c A material balance approach was used to estimate the SO₂ emission rates using the maximum sulfur concentration in the natural gas. H₂S Scavenger liquids are used to bring the fuel gas H₂S concentration below 10 ppm S.

$$\text{SO}_2 \text{ (lb/hr)} = (\text{Rated Duty, MMBtu/hr}) / (\text{Fuel Heating Value, Btu/scf}) * (\text{Sulfur, scf H}_2\text{S/MMscf gas}) * (1 \text{ lb-mol}/379 \text{ scf}) * (64.06 \text{ lb SO}_2/\text{lb-mol S})$$

$$\text{SO}_2 \text{ (lb/hr)} = (0.50 \text{ MMBtu/hr}) / (1020 \text{ Btu/scf}) * (10.0 \text{ scf S/MMscf gas}) * (1 \text{ lb-mol}/379 \text{ scf}) * (64.06 \text{ lb SO}_2/\text{lb-mol}) * (34.065 \text{ lb H}_2\text{S})$$

$$= \boxed{0.001} \text{ lb/hr SO}_2$$

^d All PM is assumed to be less than 2.5 microns in diameter per footnote "c" of AP-42 Table 1.4-2.

GLYCOL DEHYDRATOR STILL VENT POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Component	Potential to Emit FIN DEHY-SV/EPN REB-1	
	Hourly (lb/hr)	Annual (T/yr)
Hydrogen Sulfide	0.0105	0.0462
Methane	0.3647	1.5974
Ethane	0.3684	1.6135
Propane	0.3733	1.6350
Isobutane	0.0689	0.3020
n-Butane	0.1492	0.6533
Isopentane	0.0246	0.1076
n-Pentane	0.0267	0.1167
n-Hexane	0.0064	0.0279
Cyclohexane	0.0142	0.0623
Other Hexanes	0.0131	0.0573
Heptanes	0.0043	0.0190
Benzene	0.0395	0.1732
Toluene	0.0484	0.2121
Ethylbenzene	0.0014	0.0059
Xylenes	0.0091	0.0397
C8+ Heavies	0.0001	0.0001
Total VOC	0.7792	3.4121

Note: The emissions from the flash tanks are recycled and recompressed. The still vent emissions are controlled by a condenser and then routed to the pilot light of the reboiler.

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Baker Dehy

File Name: T:\ConocoPhillips - 507\507-78 Sugarkane CTB- Baker Dehy Permitting\Calcs\Winsim\bak

Date: February 06, 2013

DESCRIPTION:

Description:

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 120.00 deg. F

Pressure: 1000.00 psig

Wet Gas Water Content: Saturated

Component	Conc.
(vol %)	

Carbon Dioxide	2.3720
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Hydrogen Sulfide	0.0100
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Nitrogen	0.2540
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Methane	70.6520
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Ethane	14.0290
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Propane	6.9790
---------	--------

Isobutane	1.0610
-----------	--------

n-Butane	2.2350
----------	--------

Isopentane	0.6610
------------	--------

n-Pentane	0.6650
-----------	--------

n-Hexane	0.2180
----------	--------

Cyclohexane	0.0880
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Other Hexanes	0.4010
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Heptanes	0.1930
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Benzene	0.0270
---------	--------

Toluene	0.0620
---------	--------

Ethylbenzene	0.0040
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Xylenes	0.0230
---------	--------

C8+ Heavies	0.0760
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DRY GAS:

Flow Rate: 15.0 MMSCF/day
Water Content: 7.0 lbs. H₂O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.0 wt% H₂O
Flow Rate: 4.0 gpm

PUMP:

Glycol Pump Type: Gas Injection
Gas Injection Pump Volume Ratio: 0.080 acfm gas/gpm glycol

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 250.0 deg. F
Pressure: 125.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 100.0 deg. F
Pressure: 50.0 psia

Control Device: Combustion Device
Destruction Efficiency: 50.0 %
Excess Oxygen: 0.0 %
Ambient Air Temperature: 80.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Baker Dehy

File Name: T:\ConocoPhillips - 507\507-78 Sugarkane CTB- Baker Dehy Permitting\Calcs\Winsim\b
Date: February 06, 2013

DESCRIPTION:

Description:

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Hydrogen Sulfide	0.0105	0.253	0.0462
Methane	0.3647	8.753	1.5974
Ethane	0.3684	8.841	1.6135
Propane	0.3733	8.959	1.6350
Isobutane	0.0689	1.655	0.3020
n-Butane	0.1492	3.580	0.6533
Isopentane	0.0246	0.590	0.1076
n-Pentane	0.0267	0.640	0.1167
n-Hexane	0.0064	0.153	0.0279
Cyclohexane	0.0142	0.342	0.0623
Other Hexanes	0.0131	0.314	0.0573
Heptanes	0.0043	0.104	0.0190
Benzene	0.0395	0.949	0.1732
Toluene	0.0484	1.162	0.2121
Ethylbenzene	0.0014	0.033	0.0059
Xylenes	0.0091	0.218	0.0397
C8+ Heavies	<0.0001	<0.001	<0.0001
Total Emissions	1.5226	36.544	6.6692
Total Hydrocarbon Emissions	1.5121	36.291	6.6230
Total VOC Emissions	0.7790	18.697	3.4122
Total HAP Emissions	0.1048	2.514	0.4588
Total BTEX Emissions	0.0984	2.361	0.4309

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Hydrogen Sulfide	0.0293	0.703	0.1283
Methane	0.7425	17.819	3.2519
Ethane	0.8077	19.384	3.5376
Propane	1.1301	27.122	4.9497
Isobutane	0.2872	6.892	1.2578
n-Butane	0.7600	18.240	3.3288
Isopentane	0.2581	6.193	1.1303
n-Pentane	0.3177	7.624	1.3913
n-Hexane	0.1934	4.642	0.8471
Cyclohexane	0.5830	13.992	2.5535
Other Hexanes	0.2664	6.394	1.1668
Heptanes	0.3735	8.965	1.6361
Benzene	2.1866	52.478	9.5772
Toluene	7.5377	180.904	33.0150
Ethylbenzene	0.6909	16.582	3.0262
Xylenes	5.5708	133.699	24.4001
C8+ Heavies	0.3498	8.395	1.5321
Total Emissions	22.0845	530.027	96.7299
Total Hydrocarbon Emissions	22.0552	529.324	96.6016
Total VOC Emissions	20.5050	492.121	89.8120
Total HAP Emissions	16.1794	388.305	70.8657
Total BTEX Emissions	15.9860	383.663	70.0186

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the
Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
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Hydrogen Sulfide	0.0867	2.081	0.3797
Methane	51.7223	1241.335	226.5436
Ethane	22.2970	535.127	97.6607
Propane	17.1550	411.720	75.1389
Isobutane	3.6022	86.453	15.7776
n-Butane	8.1855	196.452	35.8525
Isopentane	2.8928	69.428	12.6706
n-Pentane	3.1251	75.002	13.6878
n-Hexane	1.3683	32.840	5.9934
Cyclohexane	1.1528	27.667	5.0492
Other Hexanes	2.3180	55.631	10.1527
Heptanes	1.6958	40.699	7.4276
Benzene	1.0036	24.086	4.3957
Toluene	2.9116	69.879	12.7529
Ethylbenzene	0.1966	4.718	0.8610
Xylenes	1.2057	28.938	5.2811
C8+ Heavies	2.2731	54.553	9.9560
Total Emissions	123.1920	2956.608	539.5810
Total Hydrocarbon Emissions	123.1053	2954.528	539.2013
Total VOC Emissions	49.0861	1178.066	214.9970
Total HAP Emissions	6.6859	160.461	29.2840
Total BTEX Emissions	5.3175	127.620	23.2907

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature: 100.00 deg. F
 Condenser Pressure: 50.00 psia
 Condenser Duty: 7.54e-003 MM BTU/hr
 Hydrocarbon Recovery: 1.53 bbls/day
 Produced Water: 4.03 bbls/day
 Ambient Temperature: 80.00 deg. F
 Excess Oxygen: 0.00 %
 Combustion Efficiency: 50.00 %
 Supplemental Fuel Requirement: 7.54e-003 MM BTU/hr

Component	Emitted	Destroyed
Hydrogen Sulfide	35.99%	64.01%
Methane	49.12%	50.88%
Ethane	45.61%	54.39%
Propane	33.03%	66.97%
Isobutane	24.01%	75.99%
n-Butane	19.63%	80.37%
Isopentane	9.52%	90.48%
n-Pentane	8.39%	91.61%
n-Hexane	3.29%	96.71%
Cyclohexane	2.44%	97.56%
Other Hexanes	4.91%	95.09%
Heptanes	1.16%	98.84%
Benzene	1.81%	98.19%
Toluene	0.64%	99.36%
Ethylbenzene	0.20%	99.80%
Xylenes	0.16%	99.84%
C8+ Heavies	0.00%	100.00%

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 5.41 lbs. H2O/MMSCF
 Temperature: 120.0 deg. F
 Pressure: 1000.0 psig
 Dry Gas Flow Rate: 15.0000 MMSCF/day
 Glycol Losses with Dry Gas: 1.2565 lb/hr

Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 102.12 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 3.96 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.29%	94.71%
Carbon Dioxide	99.66%	0.34%
Hydrogen Sulfide	98.18%	1.82%
Nitrogen	99.96%	0.04%
Methane	99.97%	0.03%
Ethane	99.92%	0.08%
Propane	99.89%	0.11%
Isobutane	99.87%	0.13%
n-Butane	99.83%	0.17%
Isopentane	99.85%	0.15%
n-Pentane	99.81%	0.19%
n-Hexane	99.74%	0.26%
Cyclohexane	98.83%	1.17%
Other Hexanes	99.79%	0.21%
Heptanes	99.60%	0.40%
Benzene	91.07%	8.93%
Toluene	89.15%	10.85%
Ethylbenzene	87.57%	12.43%
Xylenes	83.41%	16.59%
C8+ Heavies	99.02%	0.98%

FLASH TANK

Flash Control: Recycle/recompression
 Flash Temperature: 250.0 deg. F
 Flash Pressure: 125.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	97.65%	2.35%
Carbon Dioxide	7.45%	92.55%
Hydrogen Sulfide	25.26%	74.74%
Nitrogen	1.42%	98.58%
Methane	1.42%	98.58%
Ethane	3.50%	96.50%
Propane	6.18%	93.82%
Isobutane	7.38%	92.62%
n-Butane	8.50%	91.50%
Isopentane	8.37%	91.63%
n-Pentane	9.42%	90.58%
n-Hexane	12.61%	87.39%
Cyclohexane	35.35%	64.65%
Other Hexanes	10.72%	89.28%
Heptanes	18.31%	81.69%
Benzene	70.08%	29.92%
Toluene	74.30%	25.70%
Ethylbenzene	80.12%	19.88%
Xylenes	84.48%	15.52%
C8+ Heavies	21.86%	78.14%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	27.67%	72.33%
Carbon Dioxide	0.00%	100.00%
Hydrogen Sulfide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%

Isopentane	2.28%	97.72%
n-Pentane	2.28%	97.72%
n-Hexane	2.02%	97.98%
Cyclohexane	7.51%	92.49%
Other Hexanes	4.24%	95.76%
Heptanes	1.69%	98.31%
Benzene	6.95%	93.05%
Toluene	10.42%	89.58%
Ethylbenzene	12.77%	87.23%
Xylenes	15.11%	84.89%
C8+ Heavies	44.98%	55.02%

STREAM REPORTS:

WET GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 6.27e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.15e-001	6.40e+001
Carbon Dioxide	2.37e+000	1.72e+003
Hydrogen Sulfide	9.98e-003	5.62e+000
Nitrogen	2.53e-001	1.17e+002
Methane	7.05e+001	1.87e+004
Ethane	1.40e+001	6.95e+003
Propane	6.96e+000	5.07e+003
Isobutane	1.06e+000	1.02e+003
n-Butane	2.23e+000	2.14e+003
Isopentane	6.60e-001	7.86e+002
n-Pentane	6.64e-001	7.91e+002
n-Hexane	2.18e-001	3.10e+002
Cyclohexane	8.78e-002	1.22e+002
Other Hexanes	4.00e-001	5.70e+002
Heptanes	1.93e-001	3.19e+002
Benzene	2.69e-002	3.48e+001
Toluene	6.19e-002	9.42e+001
Ethylbenzene	3.99e-003	7.00e+000
Xylenes	2.29e-002	4.02e+001
C8+ Heavies	7.58e-002	2.13e+002
Total Components	100.00	3.91e+004

DRY GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 6.25e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.14e-002	3.38e+000
Carbon Dioxide	2.37e+000	1.71e+003
Hydrogen Sulfide	9.82e-003	5.52e+000
Nitrogen	2.54e-001	1.17e+002
Methane	7.07e+001	1.87e+004
Ethane	1.40e+001	6.95e+003
Propane	6.97e+000	5.07e+003
Isobutane	1.06e+000	1.02e+003
n-Butane	2.23e+000	2.14e+003
Isopentane	6.60e-001	7.85e+002
n-Pentane	6.64e-001	7.89e+002
n-Hexane	2.18e-001	3.09e+002
Cyclohexane	8.70e-002	1.21e+002
Other Hexanes	4.00e-001	5.68e+002
Heptanes	1.92e-001	3.18e+002
Benzene	2.46e-002	3.17e+001
Toluene	5.53e-002	8.39e+001

Ethylbenzene 3.50e-003 6.13e+000
Xylenes 1.92e-002 3.36e+001
C8+ Heavies 7.53e-002 2.11e+002

Total Components 100.00 3.89e+004

LEAN GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 3.99e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.89e+001	2.22e+003
Water	1.00e+000	2.25e+001
Carbon Dioxide	2.57e-011	5.78e-010
Hydrogen Sulfide	4.54e-013	1.02e-011
Nitrogen	2.01e-013	4.53e-012
Methane	9.03e-018	2.03e-016
Ethane	1.22e-007	2.75e-006
Propane	1.03e-008	2.31e-007
Isobutane	1.82e-009	4.09e-008
n-Butane	4.00e-009	8.99e-008
Isopentane	2.67e-004	6.02e-003
n-Pentane	3.30e-004	7.42e-003
n-Hexane	1.77e-004	3.98e-003
Cyclohexane	2.10e-003	4.73e-002
Other Hexanes	5.25e-004	1.18e-002
Heptanes	2.85e-004	6.42e-003
Benzene	7.26e-003	1.63e-001
Toluene	3.90e-002	8.77e-001
Ethylbenzene	4.50e-003	1.01e-001
Xylenes	4.41e-002	9.92e-001
C8+ Heavies	1.27e-002	2.86e-001

Total Components 100.00 2.25e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 4.46e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.02e+001	2.22e+003
Water	3.38e+000	8.33e+001
Carbon Dioxide	4.08e-001	1.01e+001
Hydrogen Sulfide	4.71e-003	1.16e-001
Nitrogen	1.37e-002	3.37e-001
Methane	2.13e+000	5.25e+001
Ethane	9.37e-001	2.31e+001
Propane	7.42e-001	1.83e+001
Isobutane	1.58e-001	3.89e+000
n-Butane	3.63e-001	8.94e+000
Isopentane	1.28e-001	3.16e+000
n-Pentane	1.40e-001	3.45e+000
n-Hexane	6.35e-002	1.57e+000
Cyclohexane	7.23e-002	1.78e+000
Other Hexanes	1.05e-001	2.60e+000
Heptanes	8.42e-002	2.08e+000
Benzene	1.36e-001	3.35e+000
Toluene	4.60e-001	1.13e+001
Ethylbenzene	4.01e-002	9.89e-001
Xylenes	3.15e-001	7.77e+000
C8+ Heavies	1.18e-001	2.91e+000

Total Components 100.00 2.46e+003

FLASH TANK OFF GAS STREAM

Temperature: 250.00 deg. F

Pressure: 139.70 psia
Flow Rate: 1.94e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.12e+000	1.96e+000
Carbon Dioxide	4.13e+000	9.31e+000
Hydrogen Sulfide	4.97e-002	8.67e-002
Nitrogen	2.32e-001	3.32e-001
Methane	6.30e+001	5.17e+001
Ethane	1.45e+001	2.23e+001
Propane	7.60e+000	1.72e+001
Isobutane	1.21e+000	3.60e+000
n-Butane	2.75e+000	8.19e+000
Isopentane	7.83e-001	2.89e+000
n-Pentane	8.46e-001	3.13e+000
n-Hexane	3.10e-001	1.37e+000
Cyclohexane	2.68e-001	1.15e+000
Other Hexanes	5.25e-001	2.32e+000
Heptanes	3.31e-001	1.70e+000
Benzene	2.51e-001	1.00e+000
Toluene	6.17e-001	2.91e+000
Ethylbenzene	3.62e-002	1.97e-001
Xylenes	2.22e-001	1.21e+000
C8+ Heavies	2.61e-001	2.27e+000
Total Components	100.00	1.35e+002

FLASH TANK GLYCOL STREAM

Temperature: 250.00 deg. F
Flow Rate: 4.16e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.54e+001	2.22e+003
Water	3.49e+000	8.13e+001
Carbon Dioxide	3.22e-002	7.50e-001
Hydrogen Sulfide	1.26e-003	2.93e-002
Nitrogen	2.05e-004	4.77e-003
Methane	3.19e-002	7.42e-001
Ethane	3.47e-002	8.08e-001
Propane	4.85e-002	1.13e+000
Isobutane	1.23e-002	2.87e-001
n-Butane	3.26e-002	7.60e-001
Isopentane	1.13e-002	2.64e-001
n-Pentane	1.40e-002	3.25e-001
n-Hexane	8.47e-003	1.97e-001
Cyclohexane	2.71e-002	6.30e-001
Other Hexanes	1.19e-002	2.78e-001
Heptanes	1.63e-002	3.80e-001
Benzene	1.01e-001	2.35e+000
Toluene	3.61e-001	8.41e+000
Ethylbenzene	3.40e-002	7.92e-001
Xylenes	2.82e-001	6.56e+000
C8+ Heavies	2.73e-002	6.36e-001
Total Components	100.00	2.33e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the
Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.36e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
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Water 9.08e+001 5.88e+001
Carbon Dioxide 4.74e-001 7.50e-001
Hydrogen Sulfide 2.39e-002 2.93e-002
Nitrogen 4.73e-003 4.77e-003
Methane 1.29e+000 7.42e-001

Ethane 7.47e-001 8.08e-001
Propane 7.13e-001 1.13e+000
Isobutane 1.37e-001 2.87e-001
n-Butane 3.64e-001 7.60e-001
Isopentane 9.95e-002 2.58e-001

n-Pentane 1.22e-001 3.18e-001
n-Hexane 6.24e-002 1.93e-001
Cyclohexane 1.93e-001 5.83e-001
Other Hexanes 8.60e-002 2.66e-001
Heptanes 1.04e-001 3.74e-001

Benzene 7.78e-001 2.19e+000
Toluene 2.27e+000 7.54e+000
Ethylbenzene 1.81e-001 6.91e-001
Xylenes 1.46e+000 5.57e+000
C8+ Heavies 5.71e-002 3.50e-001

Total Components 100.00 8.17e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.18e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.99e+001	5.88e+001	998800.
Carbon Dioxide	4.86e-002	2.86e-002	486.
Hydrogen Sulfide	4.77e-003	2.81e-003	48.
Nitrogen	7.53e-006	4.43e-006	0.
Methane	2.41e-003	1.42e-003	24.
Ethane	2.89e-003	1.70e-003	29.
Propane	2.51e-003	1.48e-003	25.
Isobutane	2.56e-004	1.50e-004	3.
n-Butane	7.51e-004	4.42e-004	8.
Isopentane	8.88e-005	5.23e-005	1.
n-Pentane	1.05e-004	6.16e-005	1.
n-Hexane	2.13e-005	1.25e-005	0.
Cyclohexane	2.89e-004	1.70e-004	3.
Other Hexanes	3.48e-005	2.05e-005	0.
Heptanes	8.17e-006	4.81e-006	0.
Benzene	2.53e-002	1.49e-002	253.
Toluene	2.61e-002	1.53e-002	261.
Ethylbenzene	5.59e-004	3.29e-004	6.
Xylenes	5.30e-003	3.12e-003	53.
C8+ Heavies	1.03e-008	6.07e-009	0.
Total Components	100.00	5.88e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 100.00 deg. F
Flow Rate: 4.48e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	6.05e-002	1.15e-002
Carbon Dioxide	2.02e-001	3.86e-002
Hydrogen Sulfide	2.84e-002	5.40e-003
Nitrogen	9.58e-004	1.83e-004
Methane	6.11e-002	1.16e-002
Ethane	3.63e-001	6.92e-002
Propane	2.01e+000	3.82e-001
Isobutane	7.83e-001	1.49e-001
n-Butane	2.42e+000	4.61e-001
Isopentane	1.10e+000	2.09e-001
n-Pentane	1.39e+000	2.64e-001
n-Hexane	9.48e-001	1.81e-001

Cyclohexane 2.91e+000 5.54e-001
Other Hexanes 1.26e+000 2.40e-001
Heptanes 1.92e+000 3.65e-001

Benzene 1.10e+001 2.09e+000
Toluene 3.90e+001 7.43e+000
Ethylbenzene 3.61e+000 6.88e-001
Xylenes 2.91e+001 5.55e+000
C8+ Heavies 1.84e+000 3.50e-001

Total Components 100.00 1.90e+001

CONDENSER VENT STREAM

Temperature: 100.00 deg. F
Pressure: 50.00 psia
Flow Rate: 4.46e+001 scfh

Component	Conc.	Loading
(vol%)	(lb/hr)	

Water 1.94e+000 4.11e-002
Carbon Dioxide 1.32e+001 6.82e-001
Hydrogen Sulfide 5.26e-001 2.11e-002
Nitrogen 1.39e-001 4.58e-003
Methane 3.87e+001 7.29e-001

Ethane 2.08e+001 7.37e-001
Propane 1.44e+001 7.47e-001
Isobutane 2.02e+000 1.38e-001
n-Butane 4.37e+000 2.98e-001
Isopentane 5.79e-001 4.91e-002

n-Pentane 6.29e-001 5.33e-002
n-Hexane 1.26e-001 1.27e-002
Cyclohexane 2.88e-001 2.85e-002
Other Hexanes 2.58e-001 2.62e-002
Heptanes 7.38e-002 8.69e-003

Benzene 8.61e-001 7.91e-002
Toluene 8.94e-001 9.68e-002
Ethylbenzene 2.18e-002 2.72e-003
Xylenes 1.45e-001 1.81e-002
C8+ Heavies 1.05e-004 2.11e-005

Total Components 100.00 3.77e+000

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.89e+001 scfh

Component	Conc.	Loading
(vol%)	(lb/hr)	

Hydrogen Sulfide 6.21e-001 1.05e-002
Methane 4.57e+001 3.65e-001
Ethane 2.46e+001 3.68e-001
Propane 1.70e+001 3.73e-001
Isobutane 2.38e+000 6.89e-002

n-Butane 5.15e+000 1.49e-001
Isopentane 6.84e-001 2.46e-002
n-Pentane 7.42e-001 2.67e-002
n-Hexane 1.48e-001 6.37e-003
Cyclohexane 3.40e-001 1.42e-002

Other Hexanes 3.05e-001 1.31e-002
Heptanes 8.71e-002 4.34e-003
Benzene 1.02e+000 3.95e-002
Toluene 1.06e+000 4.84e-002
Ethylbenzene 2.57e-002 1.36e-003

Xylenes 1.72e-001 9.07e-003
C8+ Heavies 1.24e-004 1.05e-005

Total Components 100.00 1.52e+000

**SUMMARY OF TANKS SENT TO FLARE POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

EPA	FIN	Description	VOC Emissions ^a						Benzene Emissions ^b						H ₂ S Emissions ^c					
			Flash Emissions ^d		VOC Emissions ^e		Uncontrolled Total		Controlled Total ^f		Flash Emissions ^d		VOC Emissions ^e		Uncontrolled Total		Controlled Total ^f		Flash Emissions ^d	
			Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)
FL-3	TK-19	500 bbl Condensate Storage Tank at Baker	55.81	244.45	17.68	131.5	73.49	257.60	1.47	51.5	0.15	0.66	0.08	0.06	0.23	0.72	0.01	0.04	0.0002	0.001
FL-3	TK-20	500 bbl Produced Water Storage Tank at Baker	1.89	8.28	0.08	0.02	1.97	8.30	0.04	0.17	0.01	0.04	0.0004	0.0001	0.01	0.04	0.0004	0.0002	0.00001	0.00004
TK-AF	TK-AF	Antifreeze Liquid Storage	--	--	0.50	0.01	0.50	0.01	--	--	--	--	--	--	--	--	--	--	--	--
TK-LOF	TK-LOF	Lube Oil Liquid Storage	--	--	0.0002	0.00002	0.0002	0.00002	--	--	--	--	--	--	--	--	--	--	--	--
TK-SCAV	TK-SCAV	H ₂ S Scavenger Liquid Storage	--	--	--	--	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

^a VOC Flash Emissions for tanks TK-18 and TK-19 are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs and emissions reports.

^b The Working/Breathing emissions for tanks TK-18 and TK-19 are calculated using AP 4.2 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

^c The Ideal Gas Law was used to estimate the H₂S emission rates using the maximum sulfur concentration in the gas coming off the tanks (100 ppm). An example calculation for hourly H₂S emissions from FIN TK-04 follows:

$$H_2S \text{ (lb/hr)} = (\% \text{ Vol } H_2S \text{ in stream}) * (\text{Total Volumetric Flow of Gas, scf/hr}) * (1 \text{ atm STP}) * (34.0798 \text{ lb/lb-mol } H_2S) / (1.314 \text{ atm-scf/lb-mol-K}) / (298 \text{ K})$$

$$H_2S \text{ (lb/hr)} = (150 \text{ ppm} / 10^6) * (805.81 \text{ scf/hr}) * (1 \text{ atm}) * (34.0798 \text{ lb/lb-mol } H_2S) / (1.314 \text{ atm-scf/lb-mol-K}) / (298 \text{ K})$$

$$H_2S \text{ (lb/hr)} = 0.01 \text{ lb/hr}$$

^d All VOC tank emissions are routed to the flare control device at Baker with a capture and control efficiency of 98%. H₂S emissions are captured at 98% and then 98% converted to SO₂ during combustion.

^e Working and breathing emissions for the Antifreeze and Lube Oil tanks were determined using Tanks 4.04 simulation software. The size and number of TK-AF and TK-LO tanks may vary, but the total throughput of the liquid and the associated VOC emissions will not exceed the proposed emission rate. Primaries from the software can be found on the following pages. An example calculation of the hourly emissions for FIN TK-AF follows:

$$VOC \text{ (lb/hr)} = (\text{Breathing Loss, lb/yr}) / (8,760 \text{ hr/yr}) - ((\text{Working Loss, lb/yr}) / (\text{Number of turnovers/yr})) / (\text{Turnovers per hour})$$

$$VOC \text{ (lb/hr)} = (8,909 \text{ lb/yr}) / (8,760 \text{ hr/yr}) - ((5,983 \text{ lb/yr}) / (12 \text{ turnovers/yr})) / (1 \text{ turnover per hour})$$

$$= 0.50 \text{ lb/hr}$$

An example calculation of the annual emissions for FIN TK-AF follows:

$$VOC \text{ (T/yr)} = (\text{Working Loss, lb/yr}) - (\text{Breathing Loss, lb/yr}) / (2,000 \text{ ton/yr})$$

$$VOC \text{ (T/yr)} = (5,983 \text{ lb/yr}) - (8,909 \text{ lb/yr}) / (2,000 \text{ ton/yr})$$

$$= 0.50 \text{ T/yr}$$

^f The size and number of the H₂S Scavenger Liquid Storage Tanks may vary, but the total throughput of the liquid and the associated VOC emissions will not exceed the proposed negligible emission rate.

NOTE: The tanks found at the Sugarkane CTB site (TK-01 through TK-19) are controlled by a VRU with 100% control efficiency (per TCEQ Standard Permit guidance) and therefore are not represented in the emissions shown here for normal operations. During VRU downtime, however, emissions from the tanks are sent to the flaring device for a 98% control efficiency. This is represented on the subsequent pages as an SMS event.

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTR - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L ₁	Initial loss = L ₁ + L ₂	Ton/Yr	See Table
L ₂	standing loss = 365 V ₁ W ₁ K ₁ K ₂	lb/Yr	See Table
L ₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₂₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₃₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₄₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₅₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₆₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₇₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₈₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₁	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₂	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₃	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₄	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₅	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₆	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₇	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₈	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₉₉	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table
L ₁₀₀	working loss = 0.001 M ₁ P ₁ Q ₁ K ₁ K ₂	lb/Yr	See Table

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42, Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42, Chapter 7 or are default unit values.

**CALCULATION OF TRUCK LOADING POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

Sample Calculations for condensate and slop:

$$\begin{aligned} \text{Loading Loss (lb/Mgal)} &= 12.46 * S * P * M / T \text{ (AP-42 Section 5.2)} \\ \text{Maximum Loading Loss} &= 12.46 * 0.60 * 11.050 * 40 / 560 = 5.901 \text{ lb/Mgal} \\ \text{Hourly Uncollected Emissions PTE} &= (\text{Hourly Throughput, Mgal/hr}) * (\text{Maximum Loading Loss, lb/Mgal}) * (1 - \text{Capture Efficiency}) \\ \text{Hourly Uncollected Emissions PTE} &= (8.19 \text{ Mgal/hr}) * (5.901 \text{ lb/Mgal}) * (1 - 0.987) = 0.63 \text{ lb/hr} \\ \text{Hourly PTE} &= (\text{Hourly Throughput, Mgal/hr}) * (\text{Maximum Loading Loss, lb/Mgal}) * (\text{Capture Efficiency}) + (\text{Hourly Uncollected Loading Emissions, lb/hr}) \\ \text{Hourly PTE} &= (8.19 \text{ Mgal/hr}) * (5.901 \text{ lb/Mgal}) * (0.987) + (0.63 \text{ lb/hr}) = 0.63 \text{ lb/hr} \\ \text{Annual Emissions} &= (\text{Annual Throughput, Mgal/yr}) * (\text{Average Loading Loss, lb/Mgal}) * (\text{Capture Efficiency}) * (1 - \text{Control Efficiency}) + (\text{Annual Uncollected Loading Emissions, lb/yr}) / (2000 \text{ lb/T}) \\ \text{Annual Emissions} &= (12516.00 \text{ Mgal/yr}) * (5.747 \text{ lb/Mgal}) * (0.987) * (1 - 1.00) + (935.08 \text{ lb/yr}) / (2000 \text{ lb/T}) = 0.47 \text{ T/yr} \end{aligned}$$

FIN	EPN	Facility Name	S	P @ 560 °R (psia)	P @ 531.7 °R (psia)	M	Maximum Loading Loss (lb/Mgal)	Average Loading Loss (lb/Mgal)	Hourly Throughput (Mgal/hr)	Annual Throughput (Mgal/yr)	Capture Efficiency	Hourly Uncollected Loading Emissions (lb/hr)	Annual Uncollected Loading Emissions (lb/yr)	VOC		Benzene	
														Hourly PTE (lb/hr)	Annual PTE (T/yr)	Hourly PTE (lb/hr)	Annual PTE (T/yr)
TRUCK1	VRU	Condensate and Slop Tank Truck Loading (Sugarkane)	0.60	11.05	10.218	40	5.901	5.747	8.19	12,516.00	0.987	0.63	935.08	0.63	0.47	0.603	0.002
TRUCK2	VRU	Produced Water Tank Truck Loading (Sugarkane)	0.60	0.11	0.023	35	0.051	0.054	8.19	6,132.00	0.987	0.01	4.30	0.01	0.002	0.00005	0.00001
TRUCK3	FL-3	Condensate Tank Truck Loading (Baker)	0.60	11.05	10.218	40	5.901	5.747	8.19	7,665.00	0.987	0.63	572.66	1.58	0.72	0.01	0.003
TRUCK4	FL-3	Produced Water Tank Truck Loading (Baker)	0.60	0.11	0.023	35	0.051	0.054	8.19	3,066.00	0.987	0.01	2.15	0.02	0.003	0.0001	0.00001

Daily maximum and daily minimum ambient temperature from Tanks 409d for the area's annual averages (81.03 and 62.05, for average of 71.5).

Annual Average Condensate Vapor Pressure at T_{LA} :

$$\begin{aligned} P &= \exp \{ [(2799/(T+459.6) - 2.227) \log_{10}(RVP) - 7261/(T+459.6) + 12.82] \\ &\quad \exp \{ [(2799/(71.54+459.6) - 2.227) \log_{10}(11.05) - 7261/(71.54+459.6) + 12.82] \} \\ &= 10.218 \text{ psia} \end{aligned}$$

Annual Average Produced Water Vapor Pressure at T_{LA} :

$$\begin{aligned} P &= \exp \{ [(2799/(T+459.6) - 2.227) \log_{10}(RVP) - 7261/(T+459.6) + 12.82] \\ &\quad \exp \{ [(2799/(71.54+459.6) - 2.227) \log_{10}(1.05*0.1) - 7261/(71.54+459.6) + 12.82] \} \\ &= 0.023 \text{ psia} \end{aligned}$$

NOTE: During normal operations the VRU controls 100% of VOC emissions from loading in Sugarkane CTB, FINs TRUCK1 and TRUCK2 (per TCEQ Standard Permit VRU guidance). Loading at Baker Dehy Unit (FINs TRUCK3 AND TRUCK4) will be captured, routed to Flare 3, and controlled at 98% capture and combustion efficiency. Capture Efficiency of 98.7% represented based upon TCEQ Guidance regarding trucks that are utilizing NSPS XX Testing.

**SUMMARY OF PROCESS FLARE FUEL GAS COMBUSTION AND
WASTE GAS COMBUSTION POTENTIAL TO EMIT- NORMAL OPERATIONS**
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	CO (lb/hr)	NO _x (lb/hr)	SO ₂ (lb/hr)	H ₂ S (lb/hr)	VOC (lb/hr)	Benzene (lb/hr)
FL-1	FL-1	Pilot Gas Combustion	0.01	0.003	0.0004	0.0000001	0.0001	0.00000003
FL-1	FL-1	Flare Assist Gas Combustion	0.44	1.93	0.03	0.00001	0.00004	0.0000003
Flare 1 Totals:			0.45	1.97	0.03	0.00001	0.01	0.000003
FL-2	FL-2	Pilot Gas Combustion	0.01	0.003	0.0004	0.0000001	0.0001	0.00000003
FL-2	FL-2	Flare Assist Gas Combustion	0.44	1.93	0.03	0.00001	0.00004	0.0000003
Flare 2 Totals:			0.45	1.97	0.03	0.00001	0.01	0.000003
FL-3	FL-3	Pilot Gas Combustion	0.01	0.003	0.0004	0.0000001	0.0001	0.00000003
FL-3	FL-3	Flare Assist Gas Combustion	0.44	1.93	0.03	0.00001	0.00004	0.0000003
FL-3	FL-3	Waste Gas Combustion	1.17	2.73	0.01	0.0001	0.0002	--
Flare 3 Totals:			1.62	4.70	0.04	0.0001	0.01	0.000003

NOTE: Pilot Gas Combustion and Flare Assist Gas Combustion calculations are shown on the following page. Waste Gas Combustion shown here is the combined sum of the waste gas from the Condensate and Produced Water tanks and loading operations shown on subsequent pages.

CALCULATION OF FLARES PILOT GAS AND FLARE ASSIST GAS POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV (Btu/sec)	Heat Release scf/hr	Operating Hours (hr/yr)	Pollutant	Emission Factors	Units	Emission Rates	
									Hourly ^a (lb/hr)	Annual ^b (T/yr)
FL-1	FL-1	Flare 1 - Process Pilot Gas Combustion	1,292	15	8,760	CO	0.2755	lb/MMBtu	0.01	0.04
						NO _x	0.138	lb/MMBtu	0.003	0.01
						PM/PM ₁₀ /PM _{2.5}	-- ^c	--	--	--
						SO ₂	150	ppm H ₂ S	0.0004	0.002
						H ₂ S	150	ppm H ₂ S	0.0000001	0.0000004
FL-1	FL-1	Flare 1 - Process Flare Assist Gas Combustion	1,292	1,250	8,760	VOC	5.5	lb/MMscf	0.0001	0.0004
						Benzene	0.0021	lb/MMscf	0.00000003	0.0000001
						CO	0.2755	lb/MMBtu	0.44	1.93
						NO _x	0.138	lb/MMBtu	0.22	0.96
						PM/PM ₁₀ /PM _{2.5}	-- ^c	--	--	--
FL-2	FL-2	Flare 2 - Process Pilot Gas Combustion	1,292	15	8,760	SO ₂	150	ppm H ₂ S	0.03	0.13
						H ₂ S	150	ppm H ₂ S	0.00001	0.00004
						VOC	5.5	lb/MMscf	0.01	0.04
						Benzene	0.0021	lb/MMscf	0.000003	0.00001
						CO	0.2755	lb/MMBtu	0.01	0.04
FL-2	FL-2	Flare 2 - Process Flare Assist Gas Combustion	1,292	1,250	8,760	NO _x	0.138	lb/MMBtu	0.003	0.01
						PM/PM ₁₀ /PM _{2.5}	-- ^c	--	--	--
						SO ₂	150	ppm H ₂ S	0.0004	0.002
						H ₂ S	150	ppm H ₂ S	0.0000001	0.0000004
						VOC	5.5	lb/MMscf	0.0001	0.0004
FL-2	FL-2	Flare 2 - Process Flare Assist Gas Combustion	1,292	1,250	8,760	Benzene	0.0021	lb/MMscf	0.00000003	0.0000001
						CO	0.2755	lb/MMBtu	0.44	1.93
						NO _x	0.138	lb/MMBtu	0.22	0.96
						PM/PM ₁₀ /PM _{2.5}	-- ^c	--	--	--
						SO ₂	150	ppm H ₂ S	0.03	0.13
FL-2	FL-2	Flare 2 - Process Flare Assist Gas Combustion	1,292	1,250	8,760	H ₂ S	150	ppm H ₂ S	0.00001	0.00004
						VOC	5.5	lb/MMscf	0.01	0.04
						Benzene	0.0021	lb/MMscf	0.000003	0.00001
						CO	0.2755	lb/MMBtu	0.44	1.93
						NO _x	0.138	lb/MMBtu	0.22	0.96

CALCULATION OF FLARES PILOT GAS AND FLARE ASSIST GAS POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV (Btu/scf)	Heat Release scf/hr	Operating Hours (hr/yr)	Pollutant	Emission Factors	Units	Emission Rates	
									Hourly ^a (lb/hr)	Annual ^b (T/yr)
FL-3	FL-3	Flare 2- Process Pilot Gas Combustion	1,292	15	8,760	CO NO _x PM/PM ₁₀ /PM _{2.5} SO ₂ H ₂ S VOC Benzene	0.2755 0.138 -- ^c 150 150 5.5 0.0021	lb/MMBtu lb/MMBtu -- ppm H ₂ S ppm H ₂ S lb/MMscf lb/MMscf	0.01 0.003 -- 0.0004 0.0000001 0.0001 0.0000003	0.04 0.01 -- 0.002 0.0000004 0.0004 0.0000001
FL-3	FL-3	Flare 2- Process Flare Assist Gas Combustion	1,292	1,250	8,760	CO NO _x PM/PM ₁₀ /PM _{2.5} SO ₂ H ₂ S VOC Benzene	0.2755 0.138 -- ^c 150 150 5.5 0.0021	lb/MMBtu lb/MMBtu -- ppm H ₂ S ppm H ₂ S lb/MMscf lb/MMscf	0.44 0.22 -- 0.03 0.00001 0.01 0.000003	1.93 0.96 -- 0.13 0.00004 0.04 0.00001

^a Emission Factors for CO and NO_x are based upon the Draft TNRRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for other high-Btu flares. An example calculation for hourly CO emissions for EPNs FL-1 and FL-2 follows:

$$\begin{aligned} \text{CO (lb/hr)} &= (\text{Heat Release, scf/hr}) * (\text{Lower Heating Value, Btu/scf}) * (\text{MM}/10^6) * (\text{Emission Factor, lb/MMBtu}) \\ \text{CO (lb/hr)} &= (15 \text{ scf/hr}) * (1,292 \text{ Btu/scf}) * (\text{MM}/10^6) * (0.2755 \text{ lb/MMBtu}) \\ &= \boxed{0.01} \text{ lb/hr CO} \end{aligned}$$

The Emission Factors for VOC and Benzene were based upon AP-42 Table 1.4-2 and 1.4-3 (dated 7/98). An example calculation for hourly VOC emissions for EPNs FL-1 and FL-02 follows:

$$\begin{aligned} \text{VOC (lb/hr)} &= (\text{Heat Release, scf/hr}) * (\text{MM}/10^6) * (\text{Emission Factor, lb/MMscf}) \\ \text{VOC (lb/hr)} &= (15 \text{ scf/hr}) * (\text{MM}/10^6) * (5.5 \text{ lb/MMscf}) \\ &= \boxed{0.0001} \text{ lb/hr VOC} \end{aligned}$$

A material balance approach was used to estimate the SO₂ and H₂S emission rates using the maximum sulfur concentration in the natural gas. As shown in Figure 6-1, H₂S concentration at the site is conservatively represented at 150 ppm. When used as a pilot gas or flare assist gas, 98% of this concentration will be converted to SO₂, and 2% will remain uncombusted and unconverted. An example calculation for hourly SO₂ emissions for the pilot gas of EPNs FL-01 and FL-02 follows:

$$\begin{aligned} \text{SO}_2 \text{ (lb/hr)} &= \text{Heat Release (scf/hr)} * (\text{Sulfur Content, ppmv}) * (98\% \text{ conversion to SO}_2) * (1 \text{ lb-mol}/379 \text{ scf}) * (34.065 \text{ lb SO}_2/\text{lb-mol}) * (64.06 \text{ lb SO}_2/34.065 \text{ lb H}_2\text{S}) \\ \text{SO}_2 \text{ (lb/hr)} &= (15 \text{ scf/hr}) * (150 \text{ ppm H}_2\text{S}) * (10^{-6} \text{ scf gas}) * (98\% \text{ converted to SO}_2) * (1 \text{ lb-mol}/379 \text{ scf}) * (34.065 \text{ lb H}_2\text{S}/\text{lb-mol}) * (64.06 \text{ lb SO}_2/34.065 \text{ lb H}_2\text{S}) \\ &= \boxed{0.000} \text{ lb/hr SO}_2 \end{aligned}$$

^b An example calculation for annual CO emissions for EPNs FL-1 and FL-02 follows:

$$\begin{aligned} \text{CO (T/yr)} &= (\text{Hourly Emissions, lb/hr}) * (\text{Annual Operating Hours, hr/yr}) * (1 \text{ T}/2,000 \text{ lb}) \\ \text{CO (T/yr)} &= (0.01 \text{ lb/hr}) * (8,760 \text{ hr/yr}) * (1 \text{ T}/2,000 \text{ lb}) \\ \text{CO (T/yr)} &= \boxed{0.04} \text{ T/yr CO} \end{aligned}$$

^c The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

PROCESS FLARE 3 (BAKER) WASTE GAS COMBUSTION EMISSIONS- NORMAL OPERATIONS
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV ^a (Btu/scf)	Waste Gas Flow Rate		Pollutant	Emission Factors	Units	Potential to Emit	
				Hourly (MMBtu/hr)	Annual (MMBtu/yr)				Hourly ^b (lb/hr)	Annual ^c (T/yr)
FL-3	FL-3	Process Flare Baker Condensate Tank and Loading	2,088	4.17	19,238.78	CO	0.2755	lb/MMBtu	1.15	2.65
						NO _x	0.1380	lb/MMBtu	0.58	1.33
						PM/PM ₁₀ /PM _{2.5}	-- ^e	--	--	--
						SO ₂	-- ^e	--	0.01	0.02
FL-3	FL-3	Process Flare Baker Produced Water Tank and Loading	1,779	0.08	575.14	H ₂ S	-- ^e	--	0.0001	0.0002
						CO	0.2755	lb/MMBtu	0.02	0.08
						NO _x	0.1380	lb/MMBtu	0.01	0.04
						PM/PM ₁₀ /PM _{2.5}	-- ^e	--	--	--
						SO ₂	0.6	lb/MMscf	0.0004	0.002
						H ₂ S	-- ^e	--	0.000004	0.00002

^a Waste gas stream lower heating value was taken from WinSim calculated stream value.

^b Emission Factors for CO and NO_x are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1 follows:

$$\begin{aligned} \text{CO (lb/hr)} &= (\text{Hourly Waste Gas Flow Rate, MMBtu/hr}) * (\text{Emission Factor, lb/MMBtu}) \\ \text{CO (lb/hr)} &= (4.17 \text{ MMBtu/hr}) * (0.2755 \text{ lb/MMBtu}) \\ &= \boxed{1.15} \text{ lb/hr CO} \end{aligned}$$

^c H₂S emissions are routed from the tanks to the flare and from the separator to the flare and then converted to SO₂. SO₂ emission rates were determined based on the combustion efficiency of 98% H₂S converted to SO₂. H₂S emitted at the flare is 2% of the stream not converted by combustion. An example calculation for hourly SO₂ emissions for EPN FL-1 follows:

$$\begin{aligned} \text{SO}_2 \text{ (lb/hr)} &= (\text{Source H}_2\text{S Emission Rate, lb/hr}) * (98\% \text{ captured H}_2\text{S stream}) * (98\% \text{ conversion to SO}_2 \text{ at combustion}) * (1 \text{ mol H}_2\text{S}/34.07 \text{ lb H}_2\text{S}) * (64.06 \text{ lb SO}_2/1 \text{ mol SO}_2) \\ \text{SO}_2 \text{ (lb/hr)} &= (0.005 \text{ lb/hr H}_2\text{S at Condensate Tanks}) * (98\%) * (98\%) * (1 \text{ mol H}_2\text{S}/34.07 \text{ lb H}_2\text{S}) * (64.06 \text{ lb SO}_2/1 \text{ mol SO}_2) \\ &= \boxed{0.01} \text{ lb/hr SO}_2 \end{aligned}$$

^d An example calculation for annual CO emissions for EPN FL-1 follows:

$$\begin{aligned} \text{CO (T/yr)} &= (\text{Annual Waste Gas Flow Rate, MMBtu/yr}) * (\text{Emission Factor, lb/MMBtu}) * (1 \text{ T} / 2,000 \text{ lb}) \\ \text{CO (T/yr)} &= (19,238.78 \text{ MMBtu/yr}) * (0.2755 \text{ lb/MMBtu}) * (1 \text{ T} / 2,000 \text{ lb}) \\ &= \boxed{2.65} \text{ T/yr CO} \end{aligned}$$

^e The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

CALCULATION OF FLARE 3 (BAKER) FEED RATES FROM FIN TK-20 AND TRUCK3

OIL & GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB - BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-20 and TRUCK3 Total Emissions:^a

VOC Emissions (lb/hr):	120.99
VOC Emissions (TPY):	279.28
Hydrocarbon Emissions (lb/hr):	199.49
Hydrocarbon Emissions (TPY):	460.48

Constituent	Heating Value ^b (Btu/lb)	Condensate Tanks Flash Gas Weight (%)	TK-20 and TRUCK3 Emissions ^c		Flare Feed Rate ^d	
			Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.93%	31.78	73.35	0.74	3,430.40
Ethane	22,304	20.53%	40.96	94.54	0.90	4,132.90
Propane	21,646	25.62%	51.11	117.97	1.08	5,005.01
I-Butane	21,242	5.66%	11.29	26.06	0.24	1,084.99
N-Butane	21,293	13.74%	27.41	63.27	0.57	2,640.53
I-Pentane	21,025	4.48%	8.94	20.63	0.18	850.14
N-Pentane	21,072	4.84%	9.66	22.29	0.20	920.60
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.35%	6.68	15.43	0.14	632.92
Cyclohexane	20,195	0.37%	0.74	1.70	0.01	67.29
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.25%	2.49	5.76	0.05	235.11
Octanes	20,747	0.38%	0.76	1.75	0.02	71.16
Nonanes	20,687	0.12%	0.24	0.55	0.005	22.30
Decanes Plus	20,638	0.32%	0.64	1.47	0.01	59.46
Benzene	18,172	0.17%	0.34	0.78	0.01	27.78
Toluene	18,422	0.22%	0.44	1.01	0.01	36.47
Ethylbenzene	18,658	0.02%	0.04	0.09	0.001	3.29
Xylene	18,438	0.11%	0.22	0.51	0.004	18.43
VOC		60.65%				
Total:					4.17	19,238.78

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-20 on the Tank Summary table with the uncontrolled emissions from the Condensate Truck Loading (FIN TRUCK3). Total Hydrocarbon Emissions were calculated as follows:

$$\text{Total HC (lb/hr)} = \text{VOC Emissions (lb/hr)} * (1 / \text{VOC\% of stream})$$

$$\text{Total HC (lb/hr)} = (120.99 \text{ lb/hr}) * (1 / 60.65\%)$$

$$\text{Total HC (lb/hr)} = 199.49 \text{ lb/hr}$$

^b Heating values taken from Perry's Chemical Engineers' Handbook, Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the WinSim program.

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

$$\text{MMBtu/hr Methane} = \text{Methane Heating Value (Btu/lb)} * \text{Hourly Methane Emissions (lb/hr)} * 98\% \text{ of stream is combusted} / 10^6$$

$$\text{MMBtu/hr Methane} = (23,861 \text{ Btu/lb}) * (31.78 \text{ lb/hr}) * 98\% / (10^6)$$

$$\text{MMBtu/hr Methane} = 0.74 \text{ MMBtu/hr}$$

An example calculation for the annual flare feed rate for Methane is demonstrated.

$$\text{MMBtu/yr Methane} = \text{Methane Heating Value (Btu/lb)} * \text{Annual Methane Emissions (T/yr)} * (2,000 \text{ lb/T}) * 98\% \text{ of stream is combusted} / 10^6$$

$$\text{MMBtu/yr Methane} = (23,861 \text{ Btu/lb}) * (73.35 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98\% / (10^6)$$

$$\text{MMBtu/yr Methane} = 3,430.40 \text{ MMBtu/yr}$$

CALCULATION OF FLARE 3 (BAKER) FEED RATES FROM FIN TK-21 AND TRUCK4
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-21 and TRUCK4 Total Emissions:^a

VOC Emissions (lb/hr):	2.47
VOC Emissions (TPY):	8.40
Hydrocarbon Emissions (lb/hr):	4.06
Hydrocarbon Emissions (TPY):	13.80

Constituent	Heating Value ^b (Btu/lb)	Produced Water Tanks Flash Gas Weight (%)	TK-21 and TRUCK4 Emissions ^c		Flare Feed Rate ^d	
			Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.69%	0.64	2.17	0.015	101.49
Ethane	22,304	20.31%	0.82	2.80	0.02	122.40
Propane	21,646	25.51%	1.04	3.52	0.02	149.34
I-Butane	21,242	5.72%	0.23	0.79	0.00	32.89
N-Butane	21,293	13.87%	0.56	1.91	0.01	79.71
I-Pentane	21,025	4.52%	0.18	0.62	0.004	25.55
N-Pentane	21,072	4.89%	0.20	0.67	0.004	27.67
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.38%	0.14	0.47	0.003	19.28
Cyclohexane	20,195	0.37%	0.02	0.05	0.0004	1.98
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.27%	0.05	0.18	0.001	7.35
Octanes	20,747	0.38%	0.02	0.05	0.0004	2.03
Nonanes	20,687	0.12%	0.005	0.02	0.0001	0.81
Decanes Plus	20,638	0.33%	0.01	0.05	0.0002	2.02
Benzene	18,172	0.17%	0.01	0.02	0.0002	0.71
Toluene	18,422	0.22%	0.01	0.03	0.0002	1.08
Ethylbenzene	18,658	0.02%	0.001	0.003	0.00002	0.11
Xylene	18,438	0.11%	0.004	0.02	0.0001	0.72
VOC		60.88%				
Total:					0.08	575.14

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-21 on the Tank Summary table and the uncontrolled emissions associated with the produced water loading, FIN TRUCK4. Total Hydrocarbon Emissions were calculated as follows:

$$\text{Total HC (lb/hr)} = \text{VOC Emissions (lb/hr)} * (1 / \text{VOC\% of stream})$$

$$\text{Total HC (lb/hr)} = (02.47 \text{ lb/hr}) * (1 / 60.88\%)$$

$$\text{Total HC (lb/hr)} = 4.06 \text{ lb/hr}$$

^b Heating values taken from Perry's Chemical Engineers' Handbook, Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

$$\text{MMBtu/hr Methane} = \text{Methane Heating Value (Btu/lb)} * \text{Hourly Methane Emissions (lb/hr)} * 98\% \text{ of stream is combusted} / 10^6$$

$$\text{MMBtu/hr Methane} = (23,861 \text{ Btu/lb}) * (0.64 \text{ lb/hr}) * 98\% / (10^6)$$

$$\text{MMBtu/hr Methane} = 0.015 \text{ MMBtu/hr}$$

An example calculation for the annual flare feed rate for Methane is demonstrated.

$$\text{MMBtu/yr Methane} = \text{Methane Heating Value (Btu/lb)} * \text{Annual Methane Emissions (T/yr)} * (2,000 \text{ lb/T}) * 98\% \text{ of stream is combusted} / 10^6$$

$$\text{MMBtu/yr Methane} = (23,861 \text{ Btu/lb}) * (2.17 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98\% / (10^6)$$

$$\text{MMBtu/yr Methane} = 101.49 \text{ MMBtu/yr}$$

SMSS - CALCULATION OF COMPRESSOR ENGINE STARTER VENT POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Description	Facility Identification Number	Facility Identification Number
	COMP-01-SV	COMP-02-SV
Number of Engine Starts per Year	52	52
Number of Engine Starts per Hour	1	1
Start Volume per Event, scf	900	900
Fuel Stream Specific Gravity	0.8185	0.8185
Fuel Stream Density, lb/scf ^a	0.0625	0.0625
VOC Percentage in Fuel Stream, wt%	30%	30%
Max Benzene Percentage in Gas Stream, wt%	0.13%	0.13%
Max H ₂ S Percentage in Fuel Stream, wt%	0.03%	0.03%
VOC Hourly Emission Rates (lb/hr): ^b	16.88	16.88
VOC Annual Emission Rates (T/yr): ^c	0.44	0.44
Benzene Hourly Emission Rates (lb/hr): ^b	0.07	0.07
Benzene Annual Emission Rates (T/yr): ^c	0.002	0.002
H ₂ S Hourly Emission Rates (lb/hr): ^b	0.02	0.02
H ₂ S Annual Emission Rates (T/yr): ^c	0.0004	0.0004

^a Gas stream density is calculated as follows:

$$(28.96 \text{ lb/mole}) / (379 \text{ scf/mole}) * (0.8185) = 0.0625 \text{ lb/scf}$$

^b Hourly starter vent VOC, benzene and H₂S emissions are calculated based upon a conservative estimate of the portion of each constituent in the volume known to blow down from the engine source. An example calculation for VOC for COMP-01-SV is as follows:

$$\text{VOC lb/hr} = (1 \text{ startup/hr}) * (900 \text{ scf/startup}) * (0.063 \text{ lb/scf}) * (30.00\%) = 16.88 \text{ lb/hr}$$

^c Annual starter VOC emission rates for COMP-01-SV is calculated as follow:

$$\text{VOC lb/hr} = (52 \text{ startups/yr}) * (900 \text{ scf/startup}) * (0.063 \text{ lb/scf}) * (30.00\%) / (2,000 \text{ lb/T}) = 0.44 \text{ T/yr}$$

SMSS - CALCULATION OF COMPRESSOR ENGINE BLOWDOWN POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Description	Facility Identification Number	Facility Identification Number
	COMP-01-BD	COMP-02-BD
Number of Blowdowns per Year	52	52
Number of Blowdowns per Hour	1	1
Blowdown Volume per Event, scf	687	646
Gas Stream Specific Gravity	0.8185	0.8185
Gas Stream Density, lb/scf ^a	0.0625	0.0625
Max VOC Percentage in Gas Stream, wt%	30%	30%
Max Benzene Percentage in Gas Stream, wt%	0.13%	0.13%
Max H ₂ S Percentage in Gas Stream, wt%	0.03%	0.03%
VOC Hourly Emission Rates (lb/hr): ^b	12.88	12.11
VOC Annual Emission Rates (T/yr): ^c	0.33	0.31
Benzene Hourly Emission Rates (lb/hr): ^b	0.06	0.05
Benzene Annual Emission Rates (T/yr): ^c	0.001	0.001
H ₂ S Hourly Emission Rates (lb/hr): ^b	0.01	0.01
H ₂ S Annual Emission Rates (T/yr): ^c	0.0003	0.0003
Controlled VOC Hourly Emission Rates (lb/hr): ^d	0.26	0.24
Controlled VOC Annual Emission Rates (T/yr): ^e	0.01	0.01
Controlled Benzene Hourly Emission Rates (lb/hr): ^d	0.001	0.001
Controlled Benzene Annual Emission Rates (T/yr): ^e	0.00002	0.00002
Controlled H ₂ S Hourly Emission Rates (lb/hr): ^d	0.0002	0.0002
Controlled H ₂ S Annual Emission Rates (T/yr): ^e	0.00001	0.00001

^a Gas stream density is calculated as follows:

$$(28.96 \text{ lb/mole}) / (379 \text{ scf/mole}) * (0.8185) = 0.0625 \text{ lb/scf}$$

^b Hourly blowdown VOC, Benzene and H₂S emissions rates are calculated. An example calculation for VOC for COMP-01-BD is as follows:

$$\text{VOC lb/hr} = (1 \text{ blowdown/hr}) * (687 \text{ scf/blowdown}) * (0.063 \text{ lb/scf}) * (30.00\% \text{ VOC in Stream}) * (100-98\% \text{ controlled at flare}) = 12.88 \text{ lb/hr}$$

^c Annual blowdown VOC, Benzene and H₂S emission rates are calculated as follows:

$$\text{VOC lb/hr} = (52 \text{ blowdowns/yr}) * (687 \text{ scf/blowdown}) * (0.063 \text{ lb/scf}) * (30.00\%) / (2,000 \text{ lb/T}) * (100\% - 98\% \text{ controlled at flare}) = 0.33 \text{ T/yr}$$

^d Hourly controlled blowdown VOC, Benzene and H₂S emissions are calculated based upon a conservative estimate of the portion of each constituent in the volume known to blowdown from the engine source. An example calculation for VOC for COMP-01-BD is as follows:

$$\text{VOC lb/hr} = (1 \text{ blowdown/hr}) * (687 \text{ scf/blowdown}) * (0 \text{ lb/scf}) * (30\% \text{ VOC in Stream}) * (100-98\% \text{ controlled at flare}) = 0.26 \text{ lb/hr}$$

^e Annual controlled blowdown VOC emission rates are calculated as follows:

$$\text{VOC T/yr} = (1 \text{ blowdown/hr}) * (687 \text{ scf/blowdown}) * (0 \text{ lb/scf}) * (30\% \text{ VOC in Stream}) * (100-98\% \text{ controlled at flare}) / (2,000 \text{ lb/T}) = 0.01 \text{ T/yr}$$

SMSS - SUMMARY OF TANKS SENT TO FLARE DURING VRU DOWNTIME POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	VOC Emissions						Benzene Emissions						H ₂ S Emissions ^f					
			Flash Emissions ^a			Uncontrolled Total			Flash Emissions ^a			Uncontrolled Total			Flash Emissions ^a			Uncontrolled Total		
			Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)
FL-2-SMSS	TK-01	through	89.23	31.23	17.68	23.74	506.91	54.97	2.14	1.10	0.25	0.09	0.08	0.11	0.33	0.20	0.01	0.004	0.02	0.01
	TK-08	500 bbl Condensate Storage Tanks																		
FL-2-SMSS	TK-09	500 bbl Slop Storage Tank	--	--	8.84	2.54	8.84	2.54	0.18	0.05	--	--	0.04	0.01	0.04	0.01	0.001	0.0002	--	--
	TK-10	through																		
FL-2-SMSS	TK-18	500 bbl Produced Water Storage Tanks	3.78	1.32	0.08	0.04	3.86	1.36	0.08	0.03	0.01	0.004	0.0002	0.0001	0.01	0.004	0.0002	0.0001	0.001	0.0004

Notes:

^a VOC and Benzene Flash Emissions are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs and emissions reports.

^b The Working/Breathing emissions for tanks TK-01 through TK-05 are calculated using AP-42 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

^c The Ideal Gas Law was used to estimate the H₂S emission rates using the maximum sulfur concentration in the gas coming off the tanks (50 ppm). An example calculation for hourly H₂S emissions from PIN TK-09 follows:

$$H_2S \text{ (lb/hr)} = (\% \text{ Vol } H_2S \text{ in stream}) * (\text{Total Volumetric Flow of Gas, scf/hr}) * (1 \text{ atm STP}) * (34.0798 \text{ lb/lb-mol } H_2S) / (1.314 \text{ atm-scf/lb-mol } K) / (298 \text{ K})$$

$$H_2S \text{ (lb/hr)} = (150 \text{ ppm} / 10^6) * (68.76 \text{ scf/hr}) * (1 \text{ atm}) * (34.0798 \text{ lb/lb-mol } H_2S) / (1.314 \text{ atm-scf/lb-mol } K) / (298 \text{ K})$$

$$H_2S \text{ (lb/hr)} = \boxed{0.001 \text{ lb/hr}}$$

^d During normal operations, tank emissions are rounded to the VRU control device which has a 100% control efficiency; per design and TCEQ Standard Permit control guidance. During VRU Downtime, the flare control device is used to contain emissions with a capture and control efficiency of 98% emissions are captured at 98% and then 98% converted to SO₂ during combustion. The emissions shown are due to VRU downtime which is conservatively estimated to occur 8% of the year.

SMSS - CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L _r	Total Loss = L _s + L _w	Ton/yr	See Table
L _s	Standing Loss = 385 V _s W _v K _s K _s	lb/yr	See Table
L _w	Working Loss = 0.001 MW P _a Q K _l K _p	lb/yr	See Table
L _t	Total Loss = L _s + L _w	lb/yr	See Table
RVP	Condensate Reid Vapor Pressure	pda	11.05
ΔP _b	Breathing vent pressure range	psi	0.06
I	Safety isolation factor	6 in/ft ² -day	152.1
P _a	Atmospheric Pressure	pda	14.7
M _v	Vapor Molecular Weight	lb/lb-mol	40
T	Annual Average Temperature	°F	71.54
T _{ss}	Daily Maximum Ambient Temperature	°R	541.03
T _{ss}	Daily Minimum Ambient Temperature	°R	522.05
ΔT _a	Daily average ambient temperature range	°R	19.0
Q _p	Product factor		1

		Tank Specifications				Material Specifications										VOC				Benzene														
		VIN	D	H/L	Capacity	Color	α	MW	Flash	Relat Vapor Pressure	Max. Heat of Vaporization (Btu/lb)	Throat Temp. (°F)	Annual Throughput (Bbl/yr)	ΔT, °F	Moisture Spots	Vv	Tu	Pva	Wv	ΔPv	Ku	Vented Vapor Spots	Turnover Factor	Standing Loss (per tank per day)	Ls	Kn	Ls	Kn	Standing Loss (per tank per day)	Total Loss (Bbl/yr)	Ls	Kn	Standing Loss (per tank per day)	Total Loss (Bbl/yr)
Material	No. of Tanks	V	12	25	500	Grey	Good	0.54	35	11.05	20	500	36.88	12.63	142.4	539.3	1.063	0.07992	3.16449	0.07992	0.19142	0.0860	0.96	1.103	4.847	50	231.26	8.04	0.84	0.9002	0.0051			
	Condensate	V	12	25	500	Grey	Good	0.54	35	11.05	20	500	36.88	12.63	142.4	539.3	1.063	0.07992	3.16449	0.07992	0.19142	0.0860	0.96	1.103	4.847	50	231.26	8.04	0.84	0.9002	0.0051			
	Strip	V	12	25	500	Grey	Good	0.54	35	11.05	20	500	36.88	12.63	142.4	539.3	1.063	0.07992	3.16449	0.07992	0.19142	0.0860	0.96	1.103	4.847	50	231.26	8.04	0.84	0.9002	0.0051			
	PW	V	12	25	500	Grey	Good	0.54	35	11.05	20	500	36.88	12.63	142.4	539.3	1.063	0.07992	3.16449	0.07992	0.19142	0.0860	0.96	1.103	4.847	50	231.26	8.04	0.84	0.9002	0.0051			

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

The emissions shown are due to VRU downtime. During normal operations the VRU controls 100% of VOC emissions from the Sugarkane CTB tanks (per TCEQ Standard Permit VRU guidance). When the VRU is down, emissions are routed to flare.2. VRU downtime is conservatively estimated to occur 8% of the year, which encompasses both downtime due to compressor maintenance (which effects the VRU) as well as downtime due to VRU maintenance. The calculations shown demonstrate this. Based on 8% downtime, this scenario is being shown to occur for 700 hours in a year.

**SMSS - CALCULATION OF TRUCK LOADING AT SUGARKANE POTENTIAL TO EMIT
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

Sample Calculations for condensate and slop:

$$\begin{aligned} \text{Loading Loss (lb/Mgal)} &= 12.46 * S * P * M / T \text{ (AP-42 Section 5.2)} \\ \text{Maximum Loading Loss} &= 12.46 * 0.60 * 11.05 * 40 / 560 = 5.901 \text{ lb/Mgal} \\ \text{Hourly Uncollected Emissions PTE} &= (\text{Hourly Throughput, Mgal/hr}) * (\text{Maximum Loading Loss, lb/Mgal}) * (1 - \text{Capture Efficiency}) \\ \text{Hourly Uncollected Emissions PTE} &= (8.19 \text{ Mgal/hr}) * (5.901 \text{ lb/Mgal}) * (1 - 0.987) = 0.63 \text{ lb/hr} \\ \text{Hourly PTE} &= ((\text{Hourly Throughput, Mgal/hr}) * (\text{Maximum Loading Loss, lb/Mgal}) * (\text{Capture Efficiency})) + (\text{Hourly Uncollected Loading Emissions, (lb/hr)}) \\ \text{Hourly PTE} &= (8.19 \text{ Mgal/hr}) * (5.901 \text{ lb/Mgal}) * (0.987) + (0.63) = 1.58 \text{ lb/hr} \\ \text{Annual Emissions} &= ((\text{Annual Throughput, Mgal/yr}) * (\text{Average Loading Loss, lb/Mgal}) * (\text{Capture Efficiency})) * (1 - \text{Control Efficiency}) + (\text{Annual Uncollected Loading Emissions, lb/yr}) / (2000 \text{ lb/T}) \\ \text{Annual Emissions} &= (995.40 \text{ Mgal/yr}) * (5.747 \text{ lb/Mgal}) * (0.987) * (1 - 0.98) + (74.37 \text{ lb/yr}) / (2000 \text{ lb/T}) = 0.09 \text{ T/yr} \end{aligned}$$

EPN	FIN	Facility Name	S	P @ 560 °R (psia)	F @ 531.7 °R (psia)	M	Maximum Loading Loss (lb/Mgal)	Average Loading Loss (lb/Mgal)	Hourly Throughput (Mgal/hr)	Annual Throughput (Mgal/yr)	Capture Efficiency	Hourly Uncollected Loading Emissions (lb/hr)	Annual Uncollected Loading Emissions (lb/yr)	FL-2 Control Efficiency	VOC		Benzene	
															Hourly PTE (lb/hr)	Annual PTE (T/yr)	Hourly PTE (lb/hr)	Annual PTE (T/yr)
FL-2-SMSS	TRUCK1	Condensate and Slop Tank Truck Loading	0.60	11.05	10.218	40	5.901	5.747	8.19	995.40	0.987	0.63	74.37	0.98	1.58	0.09	0.01	0.0004
FL-2-SMSS	TRUCK2	Produced Water Tank Truck Loading	0.60	0.11	0.023	35	0.051	0.054	8.19	487.20	0.987	0.01	0.14	0.98	0.02	0.0004	0.0001	0.000002

Daily maximum and daily minimum ambient temperature from Tanks 4.064 for this area's annual averages (81.03 and 62.05, for a range of 71-54).

Annual Average Condensate Vapor Pressure at T_{LA} :

$$P = \exp \left\{ \left[\frac{2799}{(T+459.6)} - 2.227 \right] \log_{10} (RVP) - \frac{7261}{(T-459.6)} + 12.82 \right\} \\ \exp \left\{ \left[\frac{2799}{(71.54+459.6)} - 2.227 \right] \log_{10} (11.05) - \frac{7261}{(71.54+459.6)} + 12.82 \right\} \\ 10.218 \text{ psia}$$

Annual Average Produced Water Vapor Pressure at T_{LA} :

$$P = \exp \left\{ \left[\frac{2799}{(T+459.6)} - 2.227 \right] \log_{10} (RVP) - \frac{7261}{(T-459.6)} + 12.82 \right\} \\ \exp \left\{ \left[\frac{2799}{(71.54+459.6)} - 2.227 \right] \log_{10} (11.05 * 0.01) - \frac{7261}{(71.54+459.6)} + 12.82 \right\} \\ 0.021 \text{ psia}$$

NOTE: The emissions shown are due to VRU downtime. During normal operations the VRU controls 100% of VOC emissions from loading (per TCEQ Standard Permit VRU guidance). When the VRU is down, emissions are routed to flare 2. VRU downtime is conservatively estimated to occur 8% of the year, which encompasses both downtime due to compressor maintenance (which affects the VRU) as well as downtime due to VRU maintenance. The calculations shown demonstrate this alternative operating scenario. Based on 8% downtime, this scenario is being shown to occur for 700 hours in a year. Capture Efficiency of 98.7% represented based upon TCEQ Guidance regarding trucks that are utilizing NSPS XX Testing.

**SMSS - SUMMARY OF PROCESS FLARES FUEL GAS COMBUSTION AND
WASTE GAS COMBUSTION POTENTIAL TO EMIT-NORMAL OPERATIONS
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP**

EPN	FIN	Description	CO		NO _x		SO ₂		H ₂ S	
			(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
FL-1-SMSS	COMP-01-BD	Flare Combustion (engine blowdown waste gas)	0.48	0.01	0.24	0.01	0.04	0.001	0.0004	0.00001
	COMP-02-BD									
FL-1-SMSS			0.48	0.01	0.24	0.01	0.04	0.001	0.0004	0.00001
FL-2-SMSS	FL-2-SMSS	Waste Gas Combustion (during VRU downtime)	1.59	0.58	0.80	0.30	0.04	0.02	0.0004	0.0002
	FL-2-SMSS									
FL-2-SMSS			1.59	0.58	0.80	0.30	0.04	0.02	0.0004	0.0002

NOTE: Pilot Gas Combustion and Flare Assist Gas Combustion calculations are shown on the following page. Waste Gas Combustion shown here is the combined sum of the waste gas from the Condensate and Produced Water tanks and loading operations shown on subsequent pages.

SMSS - PROCESS FLARE 1 WASTE GAS COMBUSTION EMISSIONS FROM ENGINE BLOWDOWN
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV ^a (Btu/secf)	Waste Gas Flow Rate		Pollutant	Emission Factors	Units	Potential to Emit	
				Hourly (MMBtu/hr)	Annual (MMBtu/yr)				Hourly ^b (lb/hr)	Annual ^d (T/yr)
FL-1-SMSS	COMP-01-BD	Process Flare	1,335	1.75	92.52	CO	0.2755	lb/MMBtu	0.48	0.01
	COMP-02-BD	Blowdowns Gas to Flare 1 Event				NO _x	0.1380	lb/MMBtu	0.24	0.01
						PM/PM ₁₀ /PM _{2.5}	---	---	---	---
						SO ₂	---	---	0.04	0.001
						H ₂ S	---	---	0.0004	0.00001

^a Waste gas stream lower heating value was taken from the inlet gas analysis.

^b Emission Factors for CO and NO_x are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for other high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1-SMSS follows:

$$\begin{aligned} \text{CO (lb/hr)} &= (\text{Hourly Waste Gas Flow Rate, MMBtu/hr}) * (\text{Emission Factor, lb/MMBtu}) \\ \text{CO (lb/hr)} &= (1.75 \text{ MMBtu/hr}) * (0.2755 \text{ lb/MMBtu}) \\ &= \boxed{0.48} \text{ lb/hr CO} \end{aligned}$$

^c H₂S emissions are routed from the separator and engine blowdown to flare 1 and then converted to SO₂. SO₂ emission rates were determined based on the combustion efficiency of 98% H₂S converted to SO₂. H₂S emitted at the flare is 2% of the captured stream not converted by combustion. An example calculation for hourly SO₂ emissions for EPN FL-1-SMSS follows:

$$\begin{aligned} \text{SO}_2 \text{ (lb/hr)} &= (\text{Source H}_2\text{S Emission Rate, lb/hr}) * (98\% \text{ captured H}_2\text{S stream}) * (98\% \text{ conversion to SO}_2 \text{ at combustion}) * (1 \text{ mol H}_2\text{S}/34.07 \text{ lb H}_2\text{S}) * (64.06 \text{ lb SO}_2/1 \text{ mol SO}_2) \\ \text{SO}_2 \text{ (lb/hr)} &= (1.00 \text{ lb/hr H}_2\text{S Engine BD}) * (98\%) * (98\%) * (1 \text{ mol H}_2\text{S}/34.07 \text{ lb H}_2\text{S}) * (64.06 \text{ lb SO}_2/1 \text{ mol SO}_2) \\ &= \boxed{0.04} \text{ lb/hr SO}_2 \end{aligned}$$

^d An example calculation for annual CO emissions for EPN FL-1 follows:

$$\begin{aligned} \text{CO (T/yr)} &= (\text{Annual Waste Gas Flow Rate, MMBtu/yr}) * (\text{Emission Factor, lb/MMBtu}) * (1 \text{ T} / 2,000 \text{ lb}) \\ \text{CO (T/yr)} &= (0.09252 \text{ MMBtu/yr}) * (0.2755 \text{ lb/MMBtu}) * (1 \text{ T} / 2,000 \text{ lb}) \\ &= \boxed{0.01} \text{ T/yr CO} \end{aligned}$$

^e The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

SMSS - CALCULATION OF FLARE 1 FEED RATES FROM ENGINES BLOWDOWN

OIL & GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB - BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Max Engines BD Volume (Mscf/hr) 1.33
 Max Engines BD Volume (Mscf/yr) 69.32
 Gas Density (lb/scf) 0.0625

Constituent	Heating Value ^a (Btu/lb)	Inlet Gas Weight (%)	Engine BD Emissions ^b COMP-01-BD and COMP-02-BD		Flare Feed Rate ^c	
			Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	47.98%	39.88	1.04	0.93	48.64
Ethane	22,304	17.86%	14.85	0.39	0.32	17.05
Propane	21,646	13.03%	10.83	0.28	0.23	11.88
I-Butane	21,242	2.61%	2.17	0.06	0.05	2.50
N-Butane	21,293	5.50%	4.57	0.12	0.10	5.01
I-Pentane	21,025	2.02%	1.68	0.04	0.03	1.65
N-Pentane	21,072	2.03%	1.69	0.04	0.03	1.65
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	0.80%	0.67	0.02	0.01	0.82
Cyclohexane	20,195	0.32%	0.27	0.01	0.01	0.40
Other Hexanes	20,928	1.46%	1.21	0.03	0.02	1.23
Heptanes	20,825	0.82%	0.68	0.02	0.01	0.82
Octanes	20,747	0.21%	0.17	0.005	0.003	0.20
Nonanes	20,687	0.14%	0.12	0.003	0.002	0.12
Decanes Plus	20,638	0.04%	0.03	0.001	0.001	0.04
Benzene	18,172	0.09%	0.07	0.002	0.001	0.07
Toluene	18,422	0.24%	0.20	0.01	0.004	0.36
Ethylbenzene	18,658	0.02%	0.02	0.0004	0.0004	0.01
Xylene	18,438	0.10%	0.08	0.002	0.001	0.07
Totals:					1.75	92.52

^a Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

^b Constituent Emission Rates were calculated from the known maximum blowdown volumes and density then proportioned using the Inlet Gas stream constituents weight percents. An example calculation for Methane emissions is as follows:

$$\begin{aligned}\text{Methane (lb/hr)} &= \text{Maximum BD Volume (Mscf/hr)} * \text{Gas Density (lb/scf)} * \text{Inlet Gas Weight \%} * 1000 \\ \text{Methane (lb/hr)} &= (1.33 \text{ Mscf/hr}) * (0.0625 \text{ lb/scf}) * 47.98\% * 1,000 \\ \text{Methane (lb/hr)} &= 39.88 \text{ lb/hr}\end{aligned}$$

^c An example calculation for the hourly flare feed rate for Methane is demonstrated.

$$\begin{aligned}\text{MMBtu/hr Methane} &= \text{Methane Heating Value (Btu/lb)} * \text{Hourly Methane Emissions (lb/hr)} * 98\% \text{ of stream is combusted} / 10^6 \\ \text{MMBtu/hr Methane} &= (23,861 \text{ Btu/lb}) * (0.03988 \text{ lb/hr}) * 98\% / (10^6) \\ \text{MMBtu/hr Methane} &= 0.93 \text{ MMBtu/hr}\end{aligned}$$

An example calculation for the annual flare feed rate for Methane is demonstrated.

$$\begin{aligned}\text{MMBtu/yr Methane} &= \text{Methane Heating Value (Btu/lb)} * \text{Annual Methane Emissions (T/yr)} * (2,000 \text{ lb/T}) * 98\% \text{ of stream is combusted} / 10^6 \\ \text{MMBtu/yr Methane} &= (23,861 \text{ Btu/lb}) * (1.04 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98\% / (10^6) \\ \text{MMBtu/yr Methane} &= 48.64 \text{ MMBtu/yr}\end{aligned}$$

SMSS - PROCESS FLARE 2 WASTE GAS COMBUSTION EMISSIONS
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV ^a (Btu/scf)	Waste Gas Flow Rate		Pollutant	Emission Factors	Units	Potential to Emit	
				Hourly (MMBtu/hr)	Annual (MMBtu/yr)				Hourly ^b (lb/hr)	Annual ^c (T/yr)
FL-2-SMSS	FL-2-SMSS	Process Flare	2,088	5.63	4,144.06	CO	0.2755	lb/MMBtu	1.55	0.57
		Condensate and Slop Tanks during VRU downtime				NO _x	0.1380	lb/MMBtu	0.78	0.29
						PM/PM ₁₀ /PM _{2.5}	-- ^e	--	--	--
						SO ₂	-- ^e	--	0.04	0.02
FL-2-SMSS	FL-2-SMSS	Process Flare	1,779	0.16	93.91	H ₂ S	-- ^e	--	0.0004	0.0002
		Produced Water Tank during VRU downtime				CO	0.2755	lb/MMBtu	0.04	0.01
						NO _x	0.1380	lb/MMBtu	0.02	0.01
						PM/PM ₁₀ /PM _{2.5}	-- ^e	--	--	--
						SO ₂	-- ^e	--	0.002	0.001
						H ₂ S	-- ^e	--	0.00002	0.00001

^a Waste gas stream lower heating value was taken from WinSim calculated stream value.

^b Emission Factors for CO and NO_x are based upon the Draft TNRRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for other high-Btu flares. An example calculation for hourly CO emissions for EPN FL-2-SMSS follows:

$$\text{CO (lb/hr)} = (\text{Hourly Waste Gas Flow Rate, MMBtu/hr}) \times (\text{Emission Factor, lb/MMBtu})$$

$$\text{CO (lb/hr)} = (5.63 \text{ MMBtu/hr}) \times (0.2755 \text{ lb/MMBtu})$$

$$= \boxed{1.55} \text{ lb/hr CO}$$

^c H₂S emissions are routed from the tanks to the flare to flare 2 during VRU downtime and then converted to SO₂. SO₂ emission rates were determined based on the combustion efficiency of 98% H₂S converted to SO₂. H₂S emitted at the flare is 2% of the stream not converted by combustion. An example calculation for hourly SO₂ emissions for EPN FL-2-SMSS follows:

$$\text{SO}_2 \text{ (lb/hr)} = (\text{Source H}_2\text{S Emission Rate, lb/hr}) \times (98\% \text{ captured H}_2\text{S stream}) \times (98\% \text{ conversion to SO}_2 \text{ at combustion}) \times (1 \text{ mol H}_2\text{S}/34.07 \text{ lb H}_2\text{S}) \times (64.06 \text{ lb SO}_2/1 \text{ mol SO}_2)$$

$$\text{SO}_2 \text{ (lb/hr)} = (0.02 \text{ lb/hr H}_2\text{S at Condensate Tanks}) \times (98\%) \times (98\%) \times (1 \text{ mol H}_2\text{S}/34.07 \text{ lb H}_2\text{S}) \times (64.06 \text{ lb SO}_2/1 \text{ mol SO}_2)$$

$$= \boxed{0.04} \text{ lb/hr SO}_2$$

^d An example calculation for annual CO emissions for EPN FL-2-SMSS follows:

$$\text{CO (T/yr)} = (\text{Annual Waste Gas Flow Rate, MMBtu/yr}) \times (\text{Emission Factor, lb/MMBtu}) \times (1 \text{ T} / 2,000 \text{ lb})$$

$$\text{CO (T/yr)} = (4,144.06 \text{ MMBtu/yr}) \times (0.2755 \text{ lb/MMBtu}) \times (1 \text{ T} / 2,000 \text{ lb})$$

$$= \boxed{0.57} \text{ T/yr CO}$$

^e The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

SMSS - CALCULATION OF FLARE 2 FEED RATES FROM FINs TK-01 THROUGH TK-09 AND TRUCK1
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-01 through TK-09 and TRUCK1 Total Emissions:^a

VOC Emissions (lb/hr): 163.25
VOC Emissions (TPY): 60.15
Hydrocarbon Emissions (lb/hr): 269.17
Hydrocarbon Emissions (TPY): 99.18

Constituent	Heating Value ^b (Btu/lb)	Condensate Tanks Flash Gas Weight (%)	TK-01 through TK-09 and TRUCK1 Emissions ^c		Flare Feed Rate ^d	
			Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.93%	42.88	15.80	1.00	738.93
Ethane	22,304	20.53%	55.26	20.36	1.21	890.05
Propane	21,646	25.62%	68.96	25.41	1.46	1,078.05
I-Butane	21,242	5.66%	15.24	5.61	0.32	233.57
N-Butane	21,293	13.74%	36.98	13.63	0.77	568.84
I-Pentane	21,025	4.48%	12.06	4.44	0.25	182.97
N-Pentane	21,072	4.84%	13.03	4.80	0.27	198.25
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.35%	9.02	3.32	0.18	136.18
Cyclohexane	20,195	0.37%	1.00	0.37	0.02	14.65
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.25%	3.36	1.24	0.07	50.61
Octanes	20,747	0.38%	1.02	0.38	0.02	15.45
Nonanes	20,687	0.12%	0.32	0.12	0.01	4.87
Decanes Plus	20,638	0.32%	0.86	0.32	0.02	12.94
Benzene	18,172	0.17%	0.46	0.17	0.01	6.05
Toluene	18,422	0.22%	0.59	0.22	0.01	7.94
Ethylbenzene	18,658	0.02%	0.05	0.02	0.001	0.73
Xylene	18,438	0.11%	0.30	0.11	0.01	3.98
VOC		60.65%				
Total:					5.63	4,144.06

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-01 through TK-09 on the SMSS Tank Summary table with the uncontrolled emissions from the Condensate and Slop Truck SMSS Loading (FIN TRUCK1). Total Hydrocarbon Emissions were calculated as follows:

$$\begin{aligned}\text{Total HC (lb/hr)} &= \text{VOC Emissions (lb/hr)} * (1 / \text{VOC \% of stream}) \\ \text{Total HC (lb/hr)} &= (163.25 \text{ lb/hr}) * (1 / 60.65\%) \\ \text{Total HC (lb/hr)} &= 269.17 \text{ lb/hr}\end{aligned}$$

^b Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the WinSim program.

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

$$\begin{aligned}\text{MMBtu/hr Methane} &= \text{Methane Heating Value (Btu/lb)} * \text{Hourly Methane Emissions (lb/hr)} * 98\% \text{ of stream is combusted} / 10^6 \\ \text{MMBtu/hr Methane} &= (23,861 \text{ Btu/lb}) * (42.88 \text{ lb/hr}) * 98\% / (10^6) \\ \text{MMBtu/hr Methane} &= 1.00 \text{ MMBtu/hr}\end{aligned}$$

An example calculation for the annual flare feed rate for Methane is demonstrated.

$$\begin{aligned}\text{MMBtu/yr Methane} &= \text{Methane Heating Value (Btu/lb)} * \text{Annual Methane Emissions (T/yr)} * (2,000 \text{ lb/T}) * 98\% \text{ of stream is combusted} / 10^6 \\ \text{MMBtu/yr Methane} &= (23,861 \text{ Btu/lb}) * (15.80 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98\% / (10^6) \\ \text{MMBtu/yr Methane} &= 738.93 \text{ MMBtu/yr}\end{aligned}$$

SMSS - CALCULATION OF FLARE 2 FEED RATES FROM FINs TK-10 THROUGH TK-19 AND TRUCK2

OIL & GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB - BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-10 through TK-19 and TRUCK2 Total Emissions:^a

VOC Emissions (lb/hr): 4.36
 VOC Emissions (TPY): 1.37
 Hydrocarbon Emissions (lb/hr): 7.16
 Hydrocarbon Emissions (TPY): 2.25

Constituent	Heating Value ^b (Btu/lb)	Produced Water Tanks Flash Gas Weight (%)	TK-10 through TK-19 and TRUCK2 Emissions ^c		Flare Feed Rate ^d	
			Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.69%	1.12	0.35	0.03	16.37
Ethane	22,304	20.31%	1.45	0.46	0.03	20.11
Propane	21,646	25.51%	1.83	0.57	0.04	24.18
I-Butane	21,242	5.72%	0.41	0.13	0.01	5.41
N-Butane	21,293	13.87%	0.99	0.31	0.02	12.94
I-Pentane	21,025	4.52%	0.32	0.10	0.01	4.12
N-Pentane	21,072	4.89%	0.35	0.11	0.01	4.54
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.38%	0.24	0.08	0.00	3.28
Cyclohexane	20,195	0.37%	0.03	0.01	0.001	0.40
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.27%	0.09	0.03	0.002	1.22
Octanes	20,747	0.38%	0.03	0.01	0.001	0.41
Nonanes	20,687	0.12%	0.01	0.003	0.0002	0.12
Decanes Plus	20,638	0.33%	0.02	0.01	0.000	0.40
Benzene	18,172	0.17%	0.01	0.004	0.0002	0.14
Toluene	18,422	0.22%	0.02	0.005	0.0004	0.18
Ethylbenzene	18,658	0.02%	0.001	0.0005	0.00002	0.02
Xylene	18,438	0.11%	0.01	0.002	0.0002	0.07
VOC		60.88%				
Total:					0.16	93.91

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FINs TK-10 through TK-19 on the SMSS Tank Summary table and the uncontrolled emissions associated with the produced water SMSS loading, FIN TRUCK2. Total Hydrocarbon Emissions were calculated as follows:

$$\text{Total HC (lb/hr)} = \text{VOC Emissions (lb/hr)} * (1 / \text{VOC\% of stream})$$

$$\text{Total HC (lb/hr)} = (04.36 \text{ lb/hr}) * (1 / 60.88\%)$$

$$\text{Total HC (lb/hr)} = 7.16 \text{ lb/hr}$$

^b Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

$$\text{MMBtu/hr Methane} = \text{Methane Heating Value (Btu/lb)} * \text{Hourly Methane Emissions (lb/hr)} * 98\% \text{ of stream is combusted} / 10^6$$

$$\text{MMBtu/hr Methane} = (23,861 \text{ Btu/lb}) * (1.12 \text{ lb/hr}) * 98\% / (10^6)$$

$$\text{MMBtu/hr Methane} = 0.03 \text{ MMBtu/hr}$$

An example calculation for the annual flare feed rate for Methane is demonstrated.

$$\text{MMBtu/yr Methane} = \text{Methane Heating Value (Btu/lb)} * \text{Annual Methane Emissions (T/yr)} * (2,000 \text{ lb/T}) * 98\% \text{ of stream is combusted} / 10^6$$

$$\text{MMBtu/yr Methane} = (23,861 \text{ Btu/lb}) * (0.35 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98\% / (10^6)$$

$$\text{MMBtu/yr Methane} = 16.37 \text{ MMBtu/yr}$$

DESIGN II for Windows

SUGARKANE CTB - CONDENSATE

Simulation Result:

SOLUTION RE

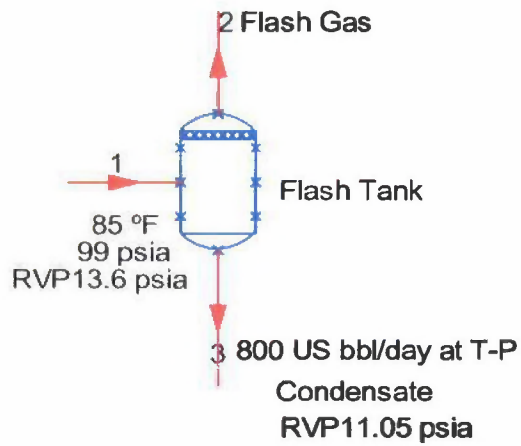
Problem:

Project:

Task:

By:

At: 19-Apr-12 11:44 AM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %
46 : NITROGEN	0.036305	0	0.036305	0	0.048001
49 : CARBON DIOXIDE	0.094544	0	0.094544	0	0.125003
2 : METHANE	1.5891	0	1.5891	0	2.10104
3 : ETHANE	1.57397	0	1.57397	0	2.08104
4 : PROPANE	2.73724	0	2.73724	0	3.61907
5 : ISOBUTANE	0.953006	0	0.953006	0	1.26003
6 : N-BUTANE	3.01936	0	3.01936	0	3.99208
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.10191	0	2.10191	0	2.77906
8 : N-PENTANE	2.89683	0	2.89683	0	3.83008
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	5.55693	0	5.55693	0	7.34715
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.322207	0	0.322207	0	0.426009
38 : CYCLOHEXANE	0.813837	0	0.813837	0	1.07602
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	5.8867	0	5.8867	0	7.78316
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.37959	0	1.37959	0	1.82404
12 : N-OCTANE	5.00555	0	5.00555	0	6.61813
45 : ETHYL BENZENE	0.335065	0	0.335065	0	0.443009
43 : M-XYLENE	1.99224	0	1.99224	0	2.63405
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	4.51316	0	4.51316	0	5.96712
14 : N-DECANE	34.8263	0	34.8263	0	46.0459
62 : WATER	0	0	0	0	0
Total	75.6339	0	75.6339	0	100

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	1.01703	0	1.01703	0	0.012061
49 : CARBON DIOXIDE	4.16078	0	4.16078	0	0.049344
2 : METHANE	25.4939	0	25.4939	0	0.302338
3 : ETHANE	47.3262	0	47.3262	0	0.561253
4 : PROPANE	120.696	0	120.696	0	1.43136
5 : ISOBUTANE	55.3887	0	55.3887	0	0.656868
6 : N-BUTANE	175.485	0	175.485	0	2.08113
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	151.644	0	151.644	0	1.79839
8 : N-PENTANE	208.995	0	208.995	0	2.47852
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	478.852	0	478.852	0	5.67882
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	25.1669	0	25.1669	0	0.298461
38 : CYCLOHEXANE	68.4892	0	68.4892	0	0.812231

79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	589.836	0	589.836	0	6.99501
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	127.107	0	127.107	0	1.50739
12 : N-OCTANE	571.754	0	571.754	0	6.78057
45 : ETHYL BENZENE	35.5705	0	35.5705	0	0.421839
43 : M-XYLENE	211.496	0	211.496	0	2.50818
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	578.813	0	578.813	0	6.86429
14 : N-DECANE	4954.95	0	4954.95	0	58.7619
62 : WATER	0	0	0	0	0
Total	8432.24	0	8432.24	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.093521	0	0.093521	0	0.048001
49 : CARBON DIOXIDE	0.243545	0	0.243545	0	0.125003
2 : METHANE	4.0935	0	4.0935	0	2.10104
3 : ETHANE	4.05453	0	4.05453	0	2.08104
4 : PROPANE	7.0511	0	7.0511	0	3.61907
5 : ISOBUTANE	2.45493	0	2.45493	0	1.26003
6 : N-BUTANE	7.77784	0	7.77784	0	3.99208
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	5.41448	0	5.41448	0	2.77906
8 : N-PENTANE	7.46221	0	7.46221	0	3.83008
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	14.3146	0	14.3146	0	7.34715
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.83	0	0.83	0	0.426009
38 : CYCLOHEXANE	2.09643	0	2.09643	0	1.07602
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	15.1641	0	15.1641	0	7.78316
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	3.5538	0	3.5538	0	1.82404
12 : N-OCTANE	12.8942	0	12.8942	0	6.61813
45 : ETHYL BENZENE	0.863122	0	0.863122	0	0.443009
43 : M-XYLENE	5.13197	0	5.13197	0	2.63405
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	11.6258	0	11.6258	0	5.96712
14 : N-DECANE	89.7121	0	89.7121	0	46.0459
62 : WATER	0	0	0	0	0
Total	194.832	0	194.832	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.02021	0	0.02021	0	0.010574
49 : CARBON DIOXIDE	0.081161	0	0.081161	0	0.042464
2 : METHANE	1.36322	0	1.36322	0	0.713241
3 : ETHANE	2.12913	0	2.12913	0	1.11397
4 : PROPANE	3.81431	0	3.81431	0	1.99567
5 : ISOBUTANE	1.5777	0	1.5777	0	0.825461
6 : N-BUTANE	4.81773	0	4.81773	0	2.52066
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	3.89303	0	3.89303	0	2.03685
8 : N-PENTANE	5.30998	0	5.30998	0	2.77821
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0

52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	11.5633	0	11.5633	0	6.04995
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.456227	0	0.456227	0	0.2387
38 : CYCLOHEXANE	1.4017	0	1.4017	0	0.733378
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	13.7431	0	13.7431	0	7.19044
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	2.33776	0	2.33776	0	1.22313
12 : N-OCTANE	12.968	0	12.968	0	6.78493
45 : ETHYL BENZENE	0.654316	0	0.654316	0	0.342341
43 : M-XYLENE	3.9035	0	3.9035	0	2.04233
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	12.8574	0	12.8574	0	6.72705
14 : N-DECANE	108.238	0	108.238	0	56.6307
62 : WATER	0	0	0	0	0
Total	191.13	0	191.13	0	100

Properties

Temperature	F	85	
Pressure	psia	98.696	
Enthalpy	Btu/hr	-1106599	
Entropy	Btu/hr/R	-1194.035	
Vapor Fraction		0	
	Total	Liquid 1	
Flowrate	lbmol/hr	75.6339	75.6339
Flowrate	lb/hr	8432.2384	8432.2384
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		111.4876	111.4876
Enthalpy	Btu/lbmol	-14631.0071	-14631.0071
Enthalpy	Btu/lb	-131.2344	-131.2344
Entropy	Btu/lbmol/R	-15.787	-15.787
Entropy	Btu/lb/R	-0.141604	-0.141604
Cp	Btu/lbmol/R		56.3698
Cp	Btu/lb/R		0.5056
Cv	Btu/lbmol/R		49.3271
Cv	Btu/lb/R		0.4424
Cp/Cv			1.1428
Density	lb/ft3		43.2796
Z-Factor			0.043502
Flowrate (T-P)	gal/min		24.2923
Flowrate (STP)	gal/min		23.8292
Specific Gravity	GPA STP		0.707396
Viscosity	cP		0.495811
Thermal Conductivity	Btu/hr/ft/R		0.068329
Surface Tension	dyne/cm		19.1391
Reid Vapor Pressure (ASTM-A	psia		13.6
True Vapor Pressure at 100 F	psia		95.25
Critical Temperature (Cubic E	F	593.0848	
Critical Pressure (Cubic EOS)	psia	479.1639	
Dew Point Temperature	F	452.1604	
Bubble Point Temperature	F	107.7105	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	88.6915	
Latent Heat of Vaporization (N	Btu/lb	103.1429	
Latent Heat of Vaporization (P	Btu/lb	324.9526	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6065.23	
Heating Value (net)	Btu/SCF	5632.2	
Wobbe Number	Btu/SCF	2923.77	
Average Hydrogen Atoms		17.2137	
Average Carbon Atoms		7.8337	
Hydrogen to Carbon Ratio		2.1974	

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.035128	0.035128	0.00001649	0	0.834113	505.969
49 : CARBON DIOXIDE	0.074136	0.074136	0.000286	0	1.76039	61.6097
2 : METHANE	1.46127	1.46127	0.00179	0	34.6984	193.878
3 : ETHANE	1.00473	1.00473	0.00797	0	23.8577	29.9343
4 : PROPANE	0.85484	0.85484	0.026356	0	20.2984	7.70166
5 : ISOBUTANE	0.143335	0.143335	0.011336	0	3.40352	3.0023
6 : N-BUTANE	0.347842	0.347842	0.037404	0	8.25959	2.20818
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.091319	0.091319	0.028151	0	2.1684	0.770284
8 : N-PENTANE	0.098742	0.098742	0.039177	0	2.34465	0.598482
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.057183	0.057183	0.077003	0	1.35784	0.176335
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.003141	0.003141	0.004467	0	0.074591	0.166971
38 : CYCLOHEXANE	0.006386	0.006386	0.011305	0	0.151648	0.134139
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.018411	0.018411	0.082163	0	0.437172	0.053208
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.003458	0.003458	0.019267	0	0.082116	0.042619
12 : N-OCTANE	0.004842	0.004842	0.070016	0	0.114983	0.016422
45 : ETHYL BENZENE	0.000316	0.000316	0.004687	0	0.007493	0.015986
43 : M-XYLENE	0.001569	0.001569	0.027872	0	0.037259	0.013368
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.001382	0.001382	0.06317	0	0.032827	0.005197
14 : N-DECANE	0.003326	0.003326	0.487563	0	0.078988	0.00162
62 : WATER	0	0	0	0	0	0.024719
Total	4.21137	4.21137	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.984042	0.984042	0.000004	0	0.668823
49 : CARBON DIOXIDE	3.26266	3.26266	0.000108	0	2.21753
2 : METHANE	23.4432	23.4432	0.000248	0	15.9336
3 : ETHANE	30.2103	30.2103	0.002066	0	20.533
4 : PROPANE	37.6933	37.6933	0.01002	0	25.619
5 : ISOBUTANE	8.33061	8.33061	0.00568	0	5.66206
6 : N-BUTANE	20.2166	20.2166	0.01874	0	13.7406
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	6.58831	6.58831	0.01751	0	4.47787
8 : N-PENTANE	7.12383	7.12383	0.02437	0	4.84185
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	4.92761	4.92761	0.0572	0	3.34914
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.24536	0.24536	0.003008	0	0.166763
38 : CYCLOHEXANE	0.537458	0.537458	0.008202	0	0.365294

79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	1.84473	1.84473	0.07097	0	1.25381
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.318617	0.318617	0.0153	0	0.216554
12 : N-OCTANE	0.553113	0.553113	0.06894	0	0.375934
45 : ETHYL BENZENE	0.033498	0.033498	0.004289	0	0.022767
43 : M-XYLENE	0.166577	0.166577	0.02551	0	0.113217
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.1773	0.1773	0.06984	0	0.120505
14 : N-DECANE	0.473275	0.473275	0.598	0	0.32167
62 : WATER	0	0	0	0	0
Total VOC:		89.230188			
Total	147.13	147.13	1	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	13.4592	13.4592	0	0	0.834113
49 : CARBON DIOXIDE	28.4055	28.4055	0	0	1.76039
2 : METHANE	559.89	559.89	0	0	34.6984
3 : ETHANE	384.965	384.965	0	0	23.8577
4 : PROPANE	327.534	327.534	0	0	20.2984
5 : ISOBUTANE	54.9189	54.9189	0	0	3.40352
6 : N-BUTANE	133.276	133.276	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	34.9891	34.9891	0	0	2.1684
8 : N-PENTANE	37.8331	37.8331	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	21.9099	21.9099	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	1.20359	1.20359	0	0	0.074591
38 : CYCLOHEXANE	2.44698	2.44698	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.05416	7.05416	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.32501	1.32501	0	0	0.082116
12 : N-OCTANE	1.85536	1.85536	0	0	0.114983
45 : ETHYL BENZENE	0.1209	0.1209	0	0	0.007493
43 : M-XYLENE	0.601208	0.601208	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.52969	0.52969	0	0	0.032827
14 : N-DECANE	1.27454	1.27454	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	1613.59	1613.59	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	13.3303	13.3303	0	0	0.834113
49 : CARBON DIOXIDE	28.1335	28.1335	0	0	1.76039
2 : METHANE	554.529	554.529	0	0	34.6984
3 : ETHANE	381.279	381.279	0	0	23.8577
4 : PROPANE	324.398	324.398	0	0	20.2984
5 : ISOBUTANE	54.3931	54.3931	0	0	3.40352
6 : N-BUTANE	132	132	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	34.6541	34.6541	0	0	2.1684
8 : N-PENTANE	37.4709	37.4709	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0

55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	21.7001	21.7001	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	1.19207	1.19207	0	0	0.074591
38 : CYCLOHEXANE	2.42355	2.42355	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	6.98663	6.98663	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.31233	1.31233	0	0	0.082116
12 : N-OCTANE	1.83759	1.83759	0	0	0.114983
45 : ETHYL BENZENE	0.119742	0.119742	0	0	0.007493
43 : M-XYLENE	0.595452	0.595452	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.524619	0.524619	0	0	0.032827
14 : N-DECANE	1.26233	1.26233	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	1598.14	1598.14	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	2139.764	
Entropy	Btu/hr/R	18.99568	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	4.2114	4.2114
Flowrate	lb/hr	147.1304	147.1304
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.9365	34.9365
Enthalpy	Btu/lbmol	508.0927	508.0927
Enthalpy	Btu/lb	14.5433	14.5433
Entropy	Btu/lbmol/R	4.5106	4.5106
Entropy	Btu/lb/R	0.129108	0.129108
Cp	Btu/lbmol/R		14.5903
Cp	Btu/lb/R		0.4176
Cv	Btu/lbmol/R		12.534
Cv	Btu/lb/R		0.3588
Cp/Cv			1.1641
Density	lb/ft3		0.091182
Z-Factor			0.991021
Flowrate (T-P)	ft3/s		0.44822
Flowrate (STP)	MMSCFD		0.038355
Viscosity	cP		0.009578
Thermal Conductivity	Btu/hr/ft/R		0.012708
Critical Temperature (Cubic E	F	173.1526	
Critical Pressure (Cubic EOS)	psia	1347.8257	
Dew Point Temperature	F	70.0076	
Bubble Point Temperature	F	-259.4223	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	1142.0302	
Vapor Sonic Velocity	ft/s	927.11	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1964.1	
Heating Value (net)	Btu/SCF	1800.85	
Wobbe Number	Btu/SCF	1778.4	
Average Hydrogen Atoms		6.4895	
Average Carbon Atoms		2.2979	
Hydrogen to Carbon Ratio		2.8241	
Methane Number		41.29	
Motor Octane Number		98.76	

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:
	Liquid 2 Visc:	NBS81	Liquid 2 ThC:	NBS81	Liquid 2 Den:

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %
46 : NITROGEN	0.001177	0	0.001177	0	0.001649
49 : CARBON DIOXIDE	0.020408	0	0.020408	0	0.028573
2 : METHANE	0.127825	0	0.127825	0	0.17897
3 : ETHANE	0.569239	0	0.569239	0	0.797002
4 : PROPANE	1.8824	0	1.8824	0	2.63559
5 : ISOBUTANE	0.809671	0	0.809671	0	1.13364
6 : N-BUTANE	2.67152	0	2.67152	0	3.74045
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.01059	0	2.01059	0	2.81506
8 : N-PENTANE	2.79809	0	2.79809	0	3.91766
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	5.49975	0	5.49975	0	7.7003
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.319065	0	0.319065	0	0.44673
38 : CYCLOHEXANE	0.80745	0	0.80745	0	1.13053
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	5.86829	0	5.86829	0	8.21631
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.37613	0	1.37613	0	1.92675
12 : N-OCTANE	5.00071	0	5.00071	0	7.00158
45 : ETHYL BENZENE	0.334749	0	0.334749	0	0.468689
43 : M-XYLENE	1.99067	0	1.99067	0	2.78717
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	4.51178	0	4.51178	0	6.31703
14 : N-DECANE	34.823	0	34.823	0	48.7563
62 : WATER	0	0	0	0	0
Total	71.4225	0	71.4225	0	100

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.032984	0	0.032984	0	0.000398
49 : CARBON DIOXIDE	0.89812	0	0.89812	0	0.01084
2 : METHANE	2.05069	0	2.05069	0	0.024751
3 : ETHANE	17.1159	0	17.1159	0	0.206586
4 : PROPANE	83.0027	0	83.0027	0	1.00183
5 : ISOBUTANE	47.0581	0	47.0581	0	0.567984
6 : N-BUTANE	155.269	0	155.269	0	1.87407
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	145.056	0	145.056	0	1.7508
8 : N-PENTANE	201.871	0	201.871	0	2.43655
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	473.924	0	473.924	0	5.72019
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	24.9216	0	24.9216	0	0.300799
38 : CYCLOHEXANE	67.9518	0	67.9518	0	0.820168

79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	587.991	0	587.991	0	7.09696
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	126.788	0	126.788	0	1.53032
12 : N-OCTANE	571.201	0	571.201	0	6.89431
45 : ETHYL BENZENE	35.537	0	35.537	0	0.428926
43 : M-XYLENE	211.329	0	211.329	0	2.55071
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	578.636	0	578.636	0	6.98405
14 : N-DECANE	4954.47	0	4954.47	0	59.7998
62 : WATER	0	0	0	0	0
Total	8285.11	0	8285.11	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.003085	0	0.003085	0	0.001649
49 : CARBON DIOXIDE	0.053472	0	0.053472	0	0.028573
2 : METHANE	0.334921	0	0.334921	0	0.17897
3 : ETHANE	1.4915	0	1.4915	0	0.797002
4 : PROPANE	4.9322	0	4.9322	0	2.63559
5 : ISOBUTANE	2.12147	0	2.12147	0	1.13364
6 : N-BUTANE	6.99982	0	6.99982	0	3.74045
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	5.26806	0	5.26806	0	2.81506
8 : N-PENTANE	7.33145	0	7.33145	0	3.91766
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	14.4102	0	14.4102	0	7.7003
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.836003	0	0.836003	0	0.44673
38 : CYCLOHEXANE	2.11565	0	2.11565	0	1.13053
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	15.3759	0	15.3759	0	8.21631
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	3.60568	0	3.60568	0	1.92675
12 : N-OCTANE	13.1027	0	13.1027	0	7.00158
45 : ETHYL BENZENE	0.877097	0	0.877097	0	0.468689
43 : M-XYLENE	5.21587	0	5.21587	0	2.78717
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	11.8216	0	11.8216	0	6.31703
14 : N-DECANE	91.2418	0	91.2418	0	48.7563
62 : WATER	0	0	0	0	0
Total	187.138	0	187.138	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000655	0	0.000655	0	0.000353
49 : CARBON DIOXIDE	0.017519	0	0.017519	0	0.009425
2 : METHANE	0.109655	0	0.109655	0	0.05899
3 : ETHANE	0.770017	0	0.770017	0	0.41424
4 : PROPANE	2.6231	0	2.6231	0	1.41113
5 : ISOBUTANE	1.34041	0	1.34041	0	0.721091
6 : N-BUTANE	4.26271	0	4.26271	0	2.29318
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	3.7239	0	3.7239	0	2.00332
8 : N-PENTANE	5.12898	0	5.12898	0	2.7592
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0

52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	11.4443	0	11.4443	0	6.15659
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.451779	0	0.451779	0	0.24304
38 : CYCLOHEXANE	1.3907	0	1.3907	0	0.748147
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	13.7001	0	13.7001	0	7.37014
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	2.3319	0	2.3319	0	1.25448
12 : N-OCTANE	12.9555	0	12.9555	0	6.96956
45 : ETHYL BENZENE	0.6537	0	0.6537	0	0.351666
43 : M-XYLENE	3.90042	0	3.90042	0	2.09828
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	12.8535	0	12.8535	0	6.91468
14 : N-DECANE	108.228	0	108.228	0	58.2225
62 : WATER	0	0	0	0	0
Total	185.886	0	185.886	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	-1152303	
Entropy	Btu/hr/R	-1281.01	
Vapor Fraction		0	
	Total	Liquid 1	
Flowrate	lbmol/hr	71.4225	71.4225
Flowrate	lb/hr	8285.108	8285.108
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		116.0014	116.0014
Enthalpy	Btu/lbmol	-16133.6115	-16133.6115
Enthalpy	Btu/lb	-139.0812	-139.0812
Entropy	Btu/lbmol/R	-17.9357	-17.9357
Entropy	Btu/lb/R	-0.154616	-0.154616
Cp	Btu/lbmol/R		57.4199
Cp	Btu/lb/R		0.495
Cv	Btu/lbmol/R		50.5021
Cv	Btu/lb/R		0.4354
Cp/Cv			1.137
Density	lb/ft3		44.2726
Z-Factor			0.006777
Flowrate (T-P)	gal/min		23.333
Flowrate (STP)	gal/min		23.1755
Specific Gravity	GPA STP		0.714658
Viscosity	cP		0.515961
Thermal Conductivity	Btu/hr/ft/R		0.065866
Surface Tension	dyne/cm		21.2374
Reid Vapor Pressure (ASTM-A	psia		11.05
True Vapor Pressure at 100 F	psia		19.47
Critical Temperature (Cubic E	F	599.2774	
Critical Pressure (Cubic EOS)	psia	431.1843	
Dew Point Temperature	F	308.9403	
Bubble Point Temperature	F	69.9748	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	14.7	
Latent Heat of Vaporization (N	Btu/lb	129.9117	
Latent Heat of Vaporization (P	Btu/lb	259.9742	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6307.05	
Heating Value (net)	Btu/SCF	5858.11	
Wobbe Number	Btu/SCF	2964.64	
Average Hydrogen Atoms		17.8461	
Average Carbon Atoms		8.1601	
Hydrogen to Carbon Ratio		2.187	

DESIGN II for Windows

SUGARKANE CTB - PW SUMMARY REPORT

Simulation Result:

SOLUTION REACHED

Problem:

Project:

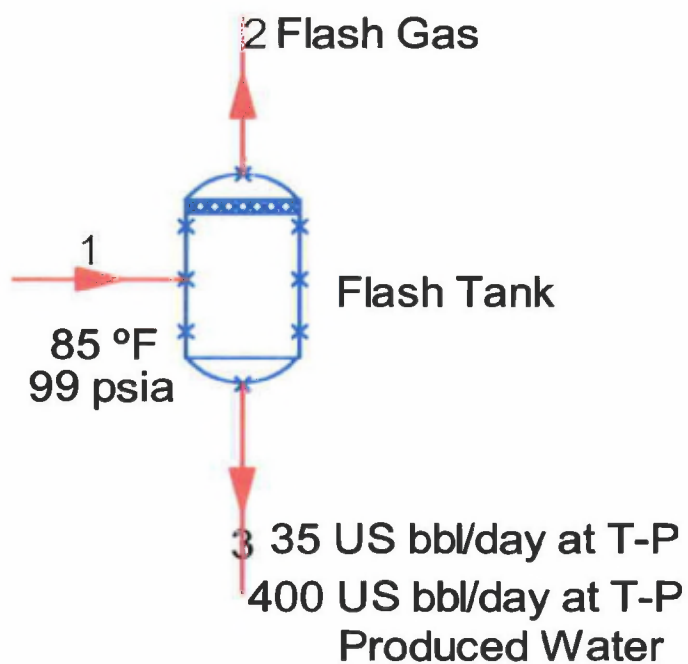
Task:

By:

At:

7-Feb-12

10:07 AM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value:	PENG-ROB NBS81 STEAM	Enthalpy:	PENG-ROB NBS81 STEAM	Density:	STD
	Liquid 1 Visc:		Liquid 1 ThC:		Liquid 1 Den:	
	Liquid 2 Visc:		Liquid 2 ThC:		Liquid 2 Den:	
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00157	0	0.001004	0.000566	0.00048	76.3973
49 : CARBON DIOXIDE	0.004087	0	0.000837	0.00325	0.00125	10.619
2 : METHANE	0.068699	0	0.047705	0.020994	0.02101	30.7589
3 : ETHANE	0.068045	0	0.063017	0.005028	0.02081	5.34955
4 : PROPANE	0.118336	0	0.115385	0.00295	0.03619	1.50467
5 : ISOBUTANE	0.0412	0	0.041058	0.000142	0.0126	0.624209
6 : N-BUTANE	0.130532	0	0.130194	0.000338	0.03992	0.468635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.288569
7 : ISOPENTANE	0.090869	0	0.09078	0.00008849	0.02779	0.175808
8 : N-PENTANE	0.125235	0	0.125138	0.00009643	0.0383	0.138973
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.07402
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.054839
52 : 2-METHYLPENTANE	0	0	0	0	0	0.049715
53 : 3-METHYLPENTANE	0	0	0	0	0	0.044482
10 : N-HEXANE	0.240235	0	0.240176	0.00005906	0.07347	0.044351
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.032828
40 : BENZENE	0.01393	0	0.013926	0.000003159	0.00426	0.040916
38 : CYCLOHEXANE	0.035183	0	0.035177	0.000006542	0.01076	0.033541
79 : 2-METHYLHEXANE	0	0	0	0	0	0.014751
80 : 3-METHYLHEXANE	0	0	0	0	0	0.014682
11 : N-HEPTANE	0.254492	0	0.254471	0.00002059	0.07783	0.01459
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.011357
41 : TOLUENE	0.059642	0	0.059638	0.000003774	0.01824	0.011414
12 : N-OCTANE	0.216398	0	0.216392	0.000005859	0.06618	0.004883
45 : ETHYL BENZENE	0.014485	0	0.014485	3.703E-07	0.00443	0.00461
43 : M-XYLENE	0.086128	0	0.086126	0.000001852	0.02634	0.003879
42 : O-XYLENE	0	0	0	0	0	0.001809
13 : N-NONANE	0.195111	0	0.19511	0.000001814	0.05967	0.001677
14 : N-DECANE	1.5056	0	1.50559	0.000004748	0.46045	0.000569
62 : WATER	323.714	0	0.003078	323.711	99	6.53687
Total	326.984	0	3.23929	323.745	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.043968	0	0.028119	0.015848	0.00071	
49 : CARBON DIOXIDE	0.179877	0	0.036827	0.14305	0.002903	
2 : METHANE	1.10214	0	0.765337	0.336805	0.017787	
3 : ETHANE	2.04599	0	1.89481	0.151178	0.033019	
4 : PROPANE	5.21789	0	5.08781	0.130081	0.084209	
5 : ISOBUTANE	2.39454	0	2.38628	0.008259	0.038644	
6 : N-BUTANE	7.58652	0	7.56686	0.019662	0.122435	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	6.55583	0	6.54944	0.006384	0.105801	
8 : N-PENTANE	9.0352	0	9.02824	0.006957	0.145815	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	20.7015	0	20.6965	0.00509	0.334092	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	1.08801	0	1.08776	0.000247	0.017559	
38 : CYCLOHEXANE	2.9609	0	2.96035	0.000551	0.047785	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	25.4996	0	25.4975	0.002063	0.411525	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	5.49505	0	5.4947	0.000348	0.088682	
12 : N-OCTANE	24.7178	0	24.7172	0.000669	0.398909	
45 : ETHYL BENZENE	1.53777	0	1.53773	0.00003931	0.024817	
43 : M-XYLENE	9.14331	0	9.14311	0.000197	0.147559	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	25.023	0	25.0228	0.000233	0.403834	
14 : N-DECANE	214.21	0	214.21	0.000676	3.45704	
62 : WATER	5831.82	0	0.055451	5831.77	94.1169	
Total	6196.36	0	363.767	5832.59	100	

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.002757	0	0.002596	0.000161	0.002746
49 : CARBON DIOXIDE	0.003088	0	0.002164	0.000924	0.003076
2 : METHANE	0.129342	0	0.123376	0.005966	0.128856
3 : ETHANE	0.164405	0	0.162977	0.001429	0.163788
4 : PROPANE	0.29925	0	0.298411	0.000838	0.298126
5 : ISOBUTANE	0.106225	0	0.106184	0.00004038	0.105826
6 : N-BUTANE	0.336805	0	0.336709	0.00009614	0.33554
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.234803	0	0.234777	0.00002515	0.233921
8 : N-PENTANE	0.323662	0	0.323635	0.0000274	0.322446
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.621163	0	0.621147	0.00001678	0.61883
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.036017	0	0.036017	8.978E-07	0.035882
38 : CYCLOHEXANE	0.090977	0	0.090975	0.000001859	0.090635
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.658122	0	0.658116	0.00000585	0.65565
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.154238	0	0.154237	0.000001073	0.153659
12 : N-OCTANE	0.559638	0	0.559636	0.000001665	0.557536
45 : ETHYL BENZENE	0.037461	0	0.037461	1.052E-07	0.037321
43 : M-XYLENE	0.22274	0	0.22274	5.264E-07	0.221903
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.504595	0	0.504595	5.154E-07	0.5027
14 : N-DECANE	3.89379	0	3.89378	0.000001349	3.87916
62 : WATER	91.998	0	0.00796	91.99	91.6524
Total	100.377	0	8.3775	91.9996	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000874	0	0.000559	0.000315	0.000859
49 : CARBON DIOXIDE	0.003509	0	0.000718	0.00279	0.003448
2 : METHANE	0.058934	0	0.040924	0.01801	0.057912
3 : ETHANE	0.092046	0	0.085245	0.006801	0.09045
4 : PROPANE	0.164899	0	0.160788	0.004111	0.16204
5 : ISOBUTANE	0.068207	0	0.067971	0.000235	0.067024
6 : N-BUTANE	0.208278	0	0.207739	0.00054	0.204667
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.168302	0	0.168138	0.000164	0.165384
8 : N-PENTANE	0.229559	0	0.229382	0.000177	0.225579
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.499899	0	0.499776	0.000123	0.491232
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.019723	0	0.019719	0.000004474	0.019381
38 : CYCLOHEXANE	0.060598	0	0.060587	0.00001127	0.059547
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.594136	0	0.594088	0.00004806	0.583835
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.101065	0	0.101059	0.000006396	0.099313
12 : N-OCTANE	0.560629	0	0.560614	0.00001518	0.550909
45 : ETHYL BENZENE	0.028287	0	0.028286	0.000000723	0.027797
43 : M-XYLENE	0.168755	0	0.168751	0.00000363	0.165829
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.555846	0	0.555841	0.000005167	0.546209
14 : N-DECANE	4.67931	0	4.67929	0.00001476	4.59818
62 : WATER	93.5015	0	0.000889	93.5006	91.8804
Total	101.764	0	8.23037	93.534	100

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-6007289		
Entropy	Btu/hr/R	-9564.731		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	326.984	3.2393	323.7447
Flowrate	lb/hr	6196.3612	363.7665	5832.5946
Mole Fraction		1	0.009907	0.990093
Mass Fraction		1	0.058706	0.941294
Molecular Weight		18.95	112.2982	18.016
Enthalpy	Btu/lbmol	-18371.8148	-14752.178	-18408.0317
Enthalpy	Btu/lb	-969.4866	-131.3661	-1021.7584
Entropy	Btu/lbmol/R	-29.2514	-15.8869	-29.3851
Entropy	Btu/lb/R	-1.5436	-0.141471	-1.6311
Cp	Btu/lbmol/R		56.9172	17.9928
Cp	Btu/lb/R		0.5068	0.9987
Cv	Btu/lbmol/R		49.8785	17.7287
Cv	Btu/lb/R		0.4442	0.984
Cp/Cv			1.1411	1.0149
Density	lb/ft3		43.4219	63.3981
Z-Factor			0.043675	0.004799
Flowrate (T-P)	gal/min		1.0445	11.4708
Flowrate (STP)	gal/min		1.0261	11.6614
Specific Gravity	GPA STP		0.708682	0.999863
Viscosity	cP		0.535142	0.807243
Thermal Conductivity	Btu/hr/ft/R		0.067989	0.355244
Surface Tension	dyne/cm		19.4988	71.2853
Reld Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		73.11	
Critical Temperature (Cubic E)	F	695.2244		
Critical Pressure (Cubic EOS)	psia	3254.5678		
Dew Point Temperature	F	322.9413		
Bubble Point Temperature	F	152.3111		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.9059		
Stream Vapor Pressure	psia	66.7783		
Latent Heat of Vaporization (N	Btu/lb	857.1977		
Latent Heat of Vaporization (P	Btu/lb	1091.036		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.65		
Heating Value (net)	Btu/SCF	56.32		
Wobbe Number	Btu/SCF	74.37		
Average Hydrogen Atoms		2.1521		
Average Carbon Atoms		0.0783		
Hydrogen to Carbon Ratio		27.4733		

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.001486	0.001486	0.00001636	0	0.827733	506.086
49 : CARBON DIOXIDE	0.001641	0.001641	0.000148	0	0.913919	61.6028
2 : METHANE	0.060745	0.060745	0.001745	0	33.839	193.912
3 : ETHANE	0.041961	0.041961	0.007808	0	23.3751	29.9379
4 : PROPANE	0.035937	0.035937	0.025989	0	20.0193	7.70283
5 : ISOBUTANE	0.006111	0.006111	0.011335	0	3.40413	3.00307
6 : N-BUTANE	0.014829	0.014829	0.037403	0	8.26093	2.20861
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.003894	0.003894	0.028151	0	2.16904	0.770489
8 : N-PENTANE	0.00421	0.00421	0.039178	0	2.34525	0.59861
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.002438	0.002438	0.077008	0	1.3584	0.176398
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.000134	0.000134	0.004468	0	0.074586	0.166949
38 : CYCLOHEXANE	0.000272	0.000272	0.011306	0	0.151666	0.134146
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.000785	0.000785	0.082169	0	0.43739	0.053231
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.000147	0.000147	0.019269	0	0.082123	0.04262
12 : N-OCTANE	0.000207	0.000207	0.070021	0	0.115056	0.016432
45 : ETHYL BENZENE	0.00001345	0.00001345	0.004687	0	0.007494	0.015987
43 : M-XYLENE	0.0000669	0.0000669	0.027874	0	0.037266	0.01337
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.00005897	0.00005897	0.063175	0	0.032852	0.0052
14 : N-DECANE	0.000142	0.000142	0.487599	0	0.079056	0.001621
62 : WATER	0.004433	0.004433	0.00065	0	2.46969	37.9843
Total	0.179511	0.179511	1	0	100	

Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.041624	0.041624	0.000004	0	0.670084	
49 : CARBON DIOXIDE	0.0722	0.0722	0.000056	0	1.16231	
2 : METHANE	0.974525	0.974525	0.000241	0	15.6883	
3 : ETHANE	1.26168	1.26168	0.002024	0	20.311	
4 : PROPANE	1.58459	1.58459	0.00988	0	25.5094	
5 : ISOBUTANE	0.355158	0.355158	0.00568	0	5.71748	
6 : N-BUTANE	0.861875	0.861875	0.01874	0	13.8748	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	0.280911	0.280911	0.01751	0	4.52223	
8 : N-PENTANE	0.303732	0.303732	0.02437	0	4.88961	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.210128	0.210128	0.05721	0	3.38273	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.010458	0.010458	0.003008	0	0.168355	
38 : CYCLOHEXANE	0.022912	0.022912	0.008203	0	0.368848	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	0.078672	0.078672	0.07098	0	1.26649	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.013582	0.013582	0.01531	0	0.218654	
12 : N-OCTANE	0.023592	0.023592	0.06895	0	0.379788	
45 : ETHYL BENZENE	0.001428	0.001428	0.00429	0	0.022989	
43 : M-XYLENE	0.007102	0.007102	0.02551	0	0.114327	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.007563	0.007563	0.06985	0	0.121758	
14 : N-DECANE	0.020191	0.020191	0.5981	0	0.325042	
62 : WATER	0.079868	0.079868	0.000101	0	1.28575	
Total	6.21179	6.21179	1	0	100	
	Total VOC	3.781894				

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.569188	0.569188	0	0	0.827733
49 : CARBON DIOXIDE	0.628453	0.628453	0	0	0.913919
2 : METHANE	23.2693	23.2693	0	0	33.839
3 : ETHANE	16.0738	16.0738	0	0	23.3751
4 : PROPANE	13.7662	13.7662	0	0	20.0193
5 : ISOBUTANE	2.34083	2.34083	0	0	3.40413
6 : N-BUTANE	5.68059	5.68059	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.49153	1.49153	0	0	2.16904
8 : N-PENTANE	1.6127	1.6127	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.934099	0.934099	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.051289	0.051289	0	0	0.074586
38 : CYCLOHEXANE	0.104293	0.104293	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.30077	0.30077	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.056472	0.056472	0	0	0.082123
12 : N-OCTANE	0.079118	0.079118	0	0	0.115056
45 : ETHYL BENZENE	0.005153	0.005153	0	0	0.007494
43 : M-XYLENE	0.025626	0.025626	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.022591	0.022591	0	0	0.032852
14 : N-DECANE	0.054362	0.054362	0	0	0.079056
62 : WATER	1.69827	1.69827	0	0	2.46969
Total	68.7646	68.7646	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.563862	0.563862	0	0	0.827733
49 : CARBON DIOXIDE	0.622573	0.622573	0	0	0.913919
2 : METHANE	23.0516	23.0516	0	0	33.839
3 : ETHANE	15.9234	15.9234	0	0	23.3751
4 : PROPANE	13.6374	13.6374	0	0	20.0193
5 : ISOBUTANE	2.31893	2.31893	0	0	3.40413
6 : N-BUTANE	5.62744	5.62744	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.47758	1.47758	0	0	2.16904
8 : N-PENTANE	1.59761	1.59761	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.92536	0.92536	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.050809	0.050809	0	0	0.074586
38 : CYCLOHEXANE	0.103317	0.103317	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.297956	0.297956	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.055943	0.055943	0	0	0.082123
12 : N-OCTANE	0.078378	0.078378	0	0	0.115056
45 : ETHYL BENZENE	0.005105	0.005105	0	0	0.007494
43 : M-XYLENE	0.025386	0.025386	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.022379	0.022379	0	0	0.032852
14 : N-DECANE	0.053854	0.053854	0	0	0.079056
62 : WATER	1.68238	1.68238	0	0	2.46969
Total	68.1212	68.1212	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	90.71079	
Entropy	Btu/hr/R	0.8297401	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	0.179511	0.179511
Flowrate	lb/hr	6.2118	6.2118
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.6041	34.6041
Enthalpy	Btu/lbmol	505.323	505.323
Enthalpy	Btu/lb	14.603	14.603
Entropy	Btu/lbmol/R	4.6222	4.6222
Entropy	Btu/lb/R	0.133575	0.133575
Cp	Btu/lbmol/R		14.5338
Cp	Btu/lb/R		0.42
Cv	Btu/lbmol/R		12.4762
Cv	Btu/lb/R		0.3605
Cp/Cv			1.1649
Density	lb/ft ³		0.090334
Z-Factor			0.990803
Flowrate (T-P)	ft ³ /s		0.019101
Flowrate (STP)	MMSCFD		0.001635
Viscosity	cP		0.009488
Thermal Conductivity	Btu/hr/ft/R		0.012672
Critical Temperature (Cubic E	F	183.9023	
Critical Pressure (Cubic EOS)	psia	1379.435	
Dew Point Temperature	F	69.9999	
Bubble Point Temperature	F	-259.9682	
Water Dew Point	F	71.5716	
Stream Vapor Pressure	psia	1136.0205	
Vapor Sonic Velocity	ft/s	931.68	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1940.02	
Heating Value (net)	Btu/SCF	1778.92	
Wobbe Number	Btu/SCF	1764.79	
Average Hydrogen Atoms		6.4538	
Average Carbon Atoms		2.263	
Hydrogen to Carbon Ratio		2.8518	
Methane Number		41.76	
Motor Octane Number		99.05	

Details for Stream 3

Stream 3 (Produced Water)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 STEAM	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 STEAM	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00008366	0	0.0000505	0.00003316	0.0000256	
49 : CARBON DIOXIDE	0.002447	0	0.000458	0.001989	0.000749	
2 : METHANE	0.007955	0	0.005388	0.002567	0.002434	
3 : ETHANE	0.026085	0	0.024107	0.001978	0.007982	
4 : PROPANE	0.082399	0	0.080242	0.002157	0.025213	
5 : ISOBUTANE	0.035089	0	0.034998	0.00009106	0.010737	
6 : N-BUTANE	0.115703	0	0.115482	0.000221	0.035404	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	0.086975	0	0.086917	0.00005802	0.026614	
8 : N-PENTANE	0.121025	0	0.120962	0.00006273	0.037033	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.237797	0	0.23776	0.00003634	0.072764	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.013796	0	0.013794	0.000001995	0.004221	
38 : CYCLOHEXANE	0.034911	0	0.034907	0.000004057	0.010683	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	0.253707	0	0.253695	0.0000117	0.077633	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.059494	0	0.059492	0.000002197	0.018205	
12 : N-OCTANE	0.216192	0	0.216188	0.000003078	0.066153	
45 : ETHYL BENZENE	0.014472	0	0.014472	2.004E-07	0.004428	
43 : M-XYLENE	0.086061	0	0.08606	9.968E-07	0.026334	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.195052	0	0.195052	8.788E-07	0.059685	
14 : N-DECANE	1.50546	0	1.50545	0.000002115	0.46066	
62 : WATER	323.71	0	0.002007	323.708	99.053	
Total	326.804	0	3.08749	323.717	100	

Flowrates					
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.002343	0	0.001415	0.000929	0.00003786
49 : CARBON DIOXIDE	0.107677	0	0.020158	0.087519	0.001739
2 : METHANE	0.127617	0	0.086437	0.04118	0.002062
3 : ETHANE	0.784311	0	0.72484	0.059471	0.01267
4 : PROPANE	3.63329	0	3.5382	0.095096	0.058695
5 : ISOBUTANE	2.03939	0	2.03409	0.005292	0.032946
6 : N-BUTANE	6.72465	0	6.7118	0.012843	0.108635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	6.27491	0	6.27073	0.004186	0.101369
8 : N-PENTANE	8.73146	0	8.72694	0.004526	0.141054
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	20.4914	0	20.4883	0.003131	0.331033
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	1.07755	0	1.07739	0.000156	0.017407
38 : CYCLOHEXANE	2.93799	0	2.93765	0.000341	0.047462
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	25.4209	0	25.4197	0.001172	0.410667
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	5.48146	0	5.48126	0.000202	0.088551
12 : N-OCTANE	24.6943	0	24.6939	0.000352	0.398928
45 : ETHYL BENZENE	1.53634	0	1.53632	0.00002128	0.024819
43 : M-XYLENE	9.1362	0	9.1361	0.000106	0.147593
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	25.0155	0	25.0154	0.000113	0.404117
14 : N-DECANE	214.19	0	214.19	0.000301	3.46018
62 : WATER	5831.74	0	0.036165	5831.71	94.21
Total	6190.15	0	358.127	5832.02	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.000142	0	0.000132	0.000009588	0.000139
49 : CARBON DIOXIDE	0.001775	0	0.0012	0.000575	0.001745
2 : METHANE	0.014855	0	0.014113	0.000742	0.014608
3 : ETHANE	0.063717	0	0.063145	0.000572	0.062656
4 : PROPANE	0.210809	0	0.210185	0.000624	0.207299
5 : ISOBUTANE	0.0917	0	0.091674	0.00002633	0.090173
6 : N-BUTANE	0.302556	0	0.302492	0.0000639	0.297517
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.227687	0	0.22767	0.00001678	0.223895
8 : N-PENTANE	0.316865	0	0.316847	0.00001814	0.311589
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.622797	0	0.622787	0.00001051	0.612426
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.036131	0	0.036131	5.769E-07	0.03553
38 : CYCLOHEXANE	0.091437	0	0.091435	0.000001173	0.089914
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.664529	0	0.664525	0.000003383	0.653463
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.155834	0	0.155833	6.352E-07	0.153239
12 : N-OCTANE	0.566282	0	0.566281	8.899E-07	0.556853
45 : ETHYL BENZENE	0.037907	0	0.037907	5.796E-08	0.037276
43 : M-XYLENE	0.225424	0	0.225424	2.882E-07	0.22167
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.510916	0	0.510916	2.541E-07	0.502408
14 : N-DECANE	3.94337	0	3.94337	6.115E-07	3.8777
62 : WATER	93.6087	0	0.005258	93.6034	92.0499
Total	101.693	0	8.08732	93.6061	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.00004657	0	0.00002811	0.00001846	0.00004586
49 : CARBON DIOXIDE	0.0021	0	0.000393	0.001707	0.002068
2 : METHANE	0.006824	0	0.004622	0.002202	0.00672
3 : ETHANE	0.035285	0	0.032609	0.002675	0.034748
4 : PROPANE	0.114822	0	0.111816	0.003005	0.113076
5 : ISOBUTANE	0.05809	0	0.057939	0.000151	0.057207
6 : N-BUTANE	0.184617	0	0.184264	0.000353	0.181809
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.161091	0	0.160983	0.000107	0.158641
8 : N-PENTANE	0.221842	0	0.221727	0.000115	0.218469
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.494824	0	0.494749	0.00007561	0.4873
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.019534	0	0.019531	0.000002825	0.019237
38 : CYCLOHEXANE	0.060129	0	0.060122	0.000006987	0.059215
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.592303	0	0.592275	0.00002731	0.583296
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.100815	0	0.100812	0.000003722	0.099282
12 : N-OCTANE	0.560094	0	0.560086	0.000007973	0.551577
45 : ETHYL BENZENE	0.028261	0	0.02826	3.914E-07	0.027831
43 : M-XYLENE	0.168624	0	0.168622	0.000001953	0.16606
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.555678	0	0.555676	0.000002504	0.547229
14 : N-DECANE	4.67887	0	4.67886	0.000006572	4.60772
62 : WATER	93.5002	0	0.00058	93.4996	92.0785
Total	101.544	0	8.03395	93.5101	100

Properties

Temperature	F	70		
Pressure	psia	14.7		
Enthalpy	Btu/hr	-6098050		
Entropy	Btu/hr/R	-9731.118		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	326.8045	3.0875	323.717
Flowrate	lb/hr	6190.1494	358.1267	5832.0226
Mole Fraction		1	0.009448	0.990552
Mass Fraction		1	0.057854	0.942146
Molecular Weight		18.9414	115.993	18.0158
Enthalpy	Btu/lbmol	-18659.6272	-16137.915	-18683.6783
Enthalpy	Btu/lb	-985.1216	-139.1284	-1037.0714
Entropy	Btu/lbmol/R	-29.7766	-17.9358	-29.8895
Entropy	Btu/lb/R	-1.572	-0.154628	-1.6591
Cp	Btu/lbmol/R		57.5519	17.9991
Cp	Btu/lb/R		0.4962	0.9991
Cv	Btu/lbmol/R		50.6338	17.8638
Cv	Btu/lb/R		0.4365	0.9916
Cp/Cv			1.1366	1.0076
Density	lb/ft3		44.2825	62.3039
Z-Factor			0.006775	0.0007479
Flowrate (T-P)	gal/min		1.0084	11.6711
Flowrate (STP)	gal/min		1.0016	11.6584
Specific Gravity	GPA STP		0.714752	1
Viscosity	cP		0.555862	0.975963
Thermal Conductivity	Btu/hr/ft/R		0.065905	0.346918
Surface Tension	dyna/cm		21.2845	72.5713
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		20.13	
Critical Temperature (Cubic E)	F	695.4634		
Critical Pressure (Cubic EOS)	psia	3249.6418		
Dew Point Temperature	F	211.5526		
Bubble Point Temperature	F	70.2894		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (N)	Btu/lb	925.8833		
Latent Heat of Vaporization (P)	Btu/lb	1063.375		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	59.62		
Heating Value (net)	Btu/SCF	55.37		
Wobbe Number	Btu/SCF	73.12		
Average Hydrogen Atoms		2.1498		
Average Carbon Atoms		0.0771		
Hydrogen to Carbon Ratio		27.8701		

DESIGN II for Windows

CONDENSATE SUMMARY REPORT

Simulation Result:

SOLUTION REACHED

Problem:

Project:

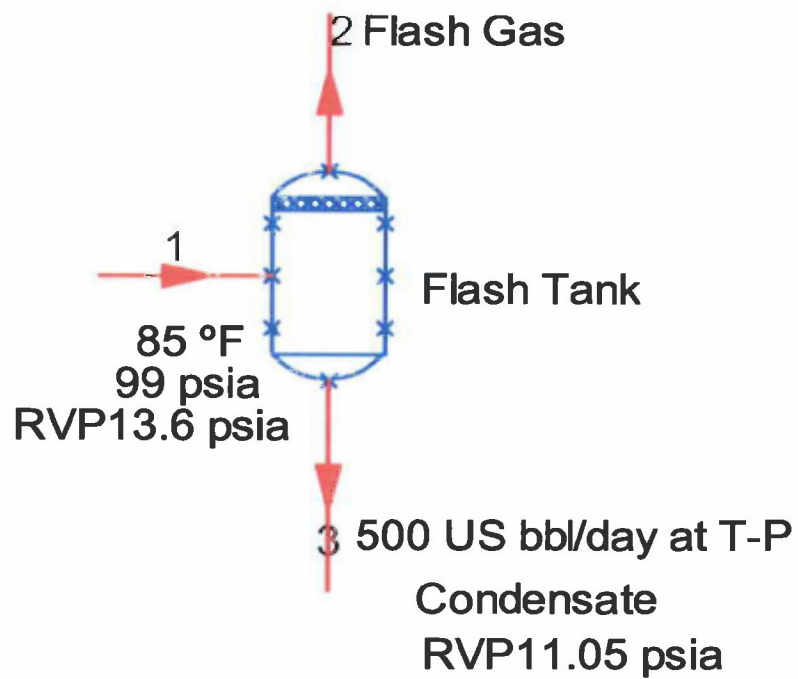
Task:

By:

At:

8-Feb-12

3:06 PM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.022707	0	0.022707	0	0.048001	
49 : CARBON DIOXIDE	0.059134	0	0.059134	0	0.125003	
2 : METHANE	0.993916	0	0.993916	0	2.10104	
3 : ETHANE	0.984455	0	0.984455	0	2.08104	
4 : PROPANE	1.71203	0	1.71203	0	3.61907	
5 : ISOBUTANE	0.596066	0	0.596066	0	1.26003	
6 : N-BUTANE	1.88849	0	1.88849	0	3.99208	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.31466	0	1.31466	0	2.77906	
8 : N-PENTANE	1.81185	0	1.81185	0	3.83008	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	3.47563	0	3.47563	0	7.34715	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.201527	0	0.201527	0	0.426009	
38 : CYCLOHEXANE	0.509021	0	0.509021	0	1.07602	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	3.68189	0	3.68189	0	7.78316	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.862876	0	0.862876	0	1.82404	
12 : N-OCTANE	3.13077	0	3.13077	0	6.61813	
45 : ETHYL BENZENE	0.209569	0	0.209569	0	0.443009	
43 : M-XYLENE	1.24606	0	1.24606	0	2.63405	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	2.8228	0	2.8228	0	5.96712	
14 : N-DECANE	21.7824	0	21.7824	0	46.0459	
62 : WATER	0	0	0	0	0	
Total	47.3059	0	47.3059	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.636108	0	0.636108	0	0.012061
49 : CARBON DIOXIDE	2.6024	0	2.6024	0	0.049344
2 : METHANE	15.9454	0	15.9454	0	0.302338
3 : ETHANE	29.6006	0	29.6006	0	0.561253
4 : PROPANE	75.4904	0	75.4904	0	1.43136
5 : ISOBUTANE	34.6434	0	34.6434	0	0.656868
6 : N-BUTANE	109.759	0	109.759	0	2.08113
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	94.8472	0	94.8472	0	1.79839
8 : N-PENTANE	130.718	0	130.718	0	2.47852
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	299.502	0	299.502	0	5.67882
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	15.7409	0	15.7409	0	0.298461
38 : CYCLOHEXANE	42.8372	0	42.8372	0	0.812231
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	368.918	0	368.918	0	6.99501
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	79.5003	0	79.5003	0	1.50739
12 : N-OCTANE	357.609	0	357.609	0	6.78057
45 : ETHYL BENZENE	22.2479	0	22.2479	0	0.421839
43 : M-XYLENE	132.282	0	132.282	0	2.50818
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	362.024	0	362.024	0	6.86429
14 : N-DECANE	3099.12	0	3099.12	0	58.7619
62 : WATER	0	0	0	0	0
Total	5274.02	0	5274.02	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.058494	0	0.058494	0	0.048001
49 : CARBON DIOXIDE	0.152327	0	0.152327	0	0.125003
2 : METHANE	2.56032	0	2.56032	0	2.10104
3 : ETHANE	2.53594	0	2.53594	0	2.08104
4 : PROPANE	4.41018	0	4.41018	0	3.61907
5 : ISOBUTANE	1.53546	0	1.53546	0	1.26003
6 : N-BUTANE	4.86472	0	4.86472	0	3.99208
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	3.38654	0	3.38654	0	2.77906
8 : N-PENTANE	4.66731	0	4.66731	0	3.83008
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	8.95318	0	8.95318	0	7.34715
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.519131	0	0.519131	0	0.426009
38 : CYCLOHEXANE	1.31123	0	1.31123	0	1.07602
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	9.4845	0	9.4845	0	7.78316
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	2.22276	0	2.22276	0	1.82404
12 : N-DCTANE	8.06481	0	8.06481	0	6.61813
45 : ETHYL BENZENE	0.539848	0	0.539848	0	0.443009
43 : M-XYLENE	3.20984	0	3.20984	0	2.63405
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	7.27149	0	7.27149	0	5.96712
14 : N-DECANE	56.1112	0	56.1112	0	46.0459
62 : WATER	0	0	0	0	0
Total	121.859	0	121.859	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.012641	0	0.012641	0	0.010574
49 : CARBON DIOXIDE	0.050763	0	0.050763	0	0.042464
2 : METHANE	0.852636	0	0.852636	0	0.713241
3 : ETHANE	1.33169	0	1.33169	0	1.11397
4 : PROPANE	2.3857	0	2.3857	0	1.99567
5 : ISOBUTANE	0.986787	0	0.986787	0	0.825461
6 : N-BUTANE	3.01329	0	3.01329	0	2.52066
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.43493	0	2.43493	0	2.03685
8 : N-PENTANE	3.32117	0	3.32117	0	2.77821
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.23234	0	7.23234	0	6.04995
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.285351	0	0.285351	0	0.2387
38 : CYCLOHEXANE	0.876708	0	0.876708	0	0.733378
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	8.59573	0	8.59573	0	7.19044
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.46217	0	1.46217	0	1.22313
12 : N-OCTANE	8.11097	0	8.11097	0	6.78493
45 : ETHYL BENZENE	0.409248	0	0.409248	0	0.342341
43 : M-XYLENE	2.44148	0	2.44148	0	2.04233
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	8.04177	0	8.04177	0	6.72705
14 : N-DECANE	67.6985	0	67.6985	0	56.6307
62 : WATER	0	0	0	0	0
Total	119.544	0	119.544	0	100

Properties

Temperature	F	85	
Pressure	psia	98.696	
Enthalpy	Btu/hr	-692132.6	
Entropy	Btu/hr/R	-746.8197	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	47.3059	47.3059
Flowrate	lb/hr	5274.0194	5274.0194
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		111.4876	111.4876
Enthalpy	Btu/lbmol	-14631.0071	-14631.0071
Enthalpy	Btu/lb	-131.2344	-131.2344
Entropy	Btu/lbmol/R	-15.787	-15.787
Entropy	Btu/lb/R	-0.141604	-0.141604
Cp	Btu/lbmol/R		56.3698
Cp	Btu/lb/R		0.5056
Cv	Btu/lbmol/R		49.3271
Cv	Btu/lb/R		0.4424
Cp/Cv			1.1428
Density	lb/ft3		43.2796
Z-Factor			0.043502
Flowrate (T-P)	gal/min		15.1938
Flowrate (STP)	gal/min		14.9042
Specific Gravity	GPA STP		0.707396
Viscosity	cP		0.495811
Thermal Conductivity	Btu/hr/ft/R		0.068329
Surface Tension	dyne/cm		19.1391
Reid Vapor Pressure (ASTM-A	psia		13.6
True Vapor Pressure at 100 F	psia		95.25
Critical Temperature (Cubic E	F	593.0848	
Critical Pressure (Cubic EOS)	psia	479.1639	
Dew Point Temperature	F	452.1604	
Bubble Point Temperature	F	107.7105	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	88.6915	
Latent Heat of Vaporization (N	Btu/lb	103.1429	
Latent Heat of Vaporization (P	Btu/lb	324.9526	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6065.23	
Heating Value (net)	Btu/SCF	5632.2	
Wobbe Number	Btu/SCF	2923.77	
Average Hydrogen Atoms		17.2137	
Average Carbon Atoms		7.8337	
Hydrogen to Carbon Ratio		2.1974	

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.021971	0.021971	0.00001649	0	0.834113	505.969
49 : CARBON DIOXIDE	0.046369	0.046369	0.000286	0	1.76039	61.6097
2 : METHANE	0.913967	0.913967	0.00179	0	34.6984	193.878
3 : ETHANE	0.62842	0.62842	0.00797	0	23.8577	29.9343
4 : PROPANE	0.534668	0.534668	0.026356	0	20.2984	7.70166
5 : ISOBUTANE	0.08965	0.08965	0.011336	0	3.40352	3.0023
6 : N-BUTANE	0.217561	0.217561	0.037404	0	8.25959	2.20818
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.057116	0.057116	0.028151	0	2.1684	0.770284
8 : N-PENTANE	0.061759	0.061759	0.039177	0	2.34465	0.598482
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236654
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.035766	0.035766	0.077003	0	1.35784	0.176335
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.001965	0.001965	0.004467	0	0.074591	0.166971
38 : CYCLOHEXANE	0.003994	0.003994	0.011305	0	0.151648	0.134139
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.011515	0.011515	0.082163	0	0.437172	0.053208
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.002163	0.002163	0.019267	0	0.082116	0.042619
12 : N-OCTANE	0.003029	0.003029	0.070016	0	0.114983	0.016422
45 : ETHYL BENZENE	0.000197	0.000197	0.004687	0	0.007493	0.015986
43 : M-XYLENE	0.000981	0.000981	0.027872	0	0.037259	0.013368
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.000865	0.000865	0.06317	0	0.032827	0.005197
14 : N-DECANE	0.002081	0.002081	0.487563	0	0.078988	0.00162
62 : WATER	0	0	0	0	0	0.024719
Total	2.63404	2.63404	1	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.615478	0.615478	0.000004	0	0.668823	
49 : CARBON DIOXIDE	2.04066	2.04066	0.000108	0	2.21753	
2 : METHANE	14.6628	14.6628	0.000248	0	15.9336	
3 : ETHANE	18.8953	18.8953	0.002066	0	20.533	
4 : PROPANE	23.5756	23.5756	0.01002	0	25.619	
5 : ISOBUTANE	5.21045	5.21045	0.00568	0	5.66206	
6 : N-BUTANE	12.6446	12.6446	0.01874	0	13.7406	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	4.12072	4.12072	0.01751	0	4.47787	
8 : N-PENTANE	4.45566	4.45566	0.02437	0	4.84185	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	3.08202	3.08202	0.0572	0	3.34914	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.153462	0.153462	0.003008	0	0.166763	
38 : CYCLOHEXANE	0.336158	0.336158	0.008202	0	0.365294	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	1.15381	1.15381	0.07097	0	1.25381	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.199282	0.199282	0.0153	0	0.216554	
12 : N-OCTANE	0.345949	0.345949	0.06894	0	0.375934	
45 : ETHYL BENZENE	0.020951	0.020951	0.004289	0	0.022767	
43 : M-XYLENE	0.104187	0.104187	0.02551	0	0.113217	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.110894	0.110894	0.06984	0	0.120505	
14 : N-DECANE	0.296014	0.296014	0.598	0	0.32167	
62 : WATER	0	0	0	0	0	
Total	92.024	92.024	1	0	100	
Total VOC		55.809757				

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	8.41816	8.41816	0	0	0.834113
49 : CARBON DIOXIDE	17.7665	17.7665	0	0	1.76039
2 : METHANE	350.188	350.188	0	0	34.6984
3 : ETHANE	240.78	240.78	0	0	23.8577
4 : PROPANE	204.859	204.859	0	0	20.2984
5 : ISOBUTANE	34.3495	34.3495	0	0	3.40352
6 : N-BUTANE	83.3587	83.3587	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	21.8842	21.8842	0	0	2.1684
8 : N-PENTANE	23.663	23.663	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	13.7038	13.7038	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.752796	0.752796	0	0	0.074591
38 : CYCLOHEXANE	1.53049	1.53049	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	4.41209	4.41209	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.828741	0.828741	0	0	0.082116
12 : N-DCTANE	1.16045	1.16045	0	0	0.114983
45 : ETHYL BENZENE	0.075618	0.075618	0	0	0.007493
43 : M-XYLENE	0.376031	0.376031	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.331299	0.331299	0	0	0.032827
14 : N-DECANE	0.79717	0.79717	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	1009.24	1009.24	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	8.33756	8.33756	0	0	0.834113
49 : CARBON DIOXIDE	17.5964	17.5964	0	0	1.76039
2 : METHANE	346.835	346.835	0	0	34.6984
3 : ETHANE	238.475	238.475	0	0	23.8577
4 : PROPANE	202.897	202.897	0	0	20.2984
5 : ISOBUTANE	34.0206	34.0206	0	0	3.40352
6 : N-BUTANE	82.5606	82.5606	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	21.6747	21.6747	0	0	2.1684
8 : N-PENTANE	23.4365	23.4365	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	13.5726	13.5726	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.745589	0.745589	0	0	0.074591
38 : CYCLOHEXANE	1.51583	1.51583	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	4.36985	4.36985	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.820807	0.820807	0	0	0.082116
12 : N-DCTANE	1.14934	1.14934	0	0	0.114983
45 : ETHYL BENZENE	0.074894	0.074894	0	0	0.007493
43 : M-XYLENE	0.372431	0.372431	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.328127	0.328127	0	0	0.032827
14 : N-DECANE	0.789538	0.789538	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	999.573	999.573	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	1338.335	
Entropy	Btu/hr/R	11.88102	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	2.634	2.634
Flowrate	lb/hr	92.024	92.024
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.9365	34.9365
Enthalpy	Btu/lbmol	508.0927	508.0927
Enthalpy	Btu/lb	14.5433	14.5433
Entropy	Btu/lbmol/R	4.5106	4.5106
Entropy	Btu/lb/R	0.129108	0.129108
Cp	Btu/lbmol/R		14.5903
Cp	Btu/lb/R		0.4176
Cv	Btu/lbmol/R		12.534
Cv	Btu/lb/R		0.3588
Cp/Cv			1.1641
Density	lb/ft3		0.091182
Z-Factor			0.991021
Flowrate (T-P)	ft3/s		0.280343
Flowrate (STP)	MMSCFD		0.02399
Viscosity	cP		0.009578
Thermal Conductivity	Btu/hr/ft/R		0.012708
Critical Temperature (Cubic E	F	173.1526	
Critical Pressure (Cubic EOS)	psia	1347.8257	
Dew Point Temperature	F	70.0076	
Bubble Point Temperature	F	-259.4223	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	1142.0302	
Vapor Sonic Velocity	ft/s	927.11	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1964.1	
Heating Value (net)	Btu/SCF	1800.85	
Wobbe Number	Btu/SCF	1778.4	
Average Hydrogen Atoms		6.4895	
Average Carbon Atoms		2.2979	
Hydrogen to Carbon Ratio		2.8241	
Methane Number		41.29	
Motor Octane Number		98.76	

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	NBS81	Liquid 2 ThC:	NBS81	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000736	0	0.000736	0	0.001649	
49 : CARBON DIOXIDE	0.012764	0	0.012764	0	0.028573	
2 : METHANE	0.079949	0	0.079949	0	0.17897	
3 : ETHANE	0.356035	0	0.356035	0	0.797002	
4 : PROPANE	1.17737	0	1.17737	0	2.63559	
5 : ISOBUTANE	0.506416	0	0.506416	0	1.13364	
6 : N-BUTANE	1.67093	0	1.67093	0	3.74045	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.25754	0	1.25754	0	2.81506	
8 : N-PENTANE	1.75009	0	1.75009	0	3.91766	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	3.43987	0	3.43987	0	7.7003	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.199562	0	0.199562	0	0.44673	
38 : CYCLOHEXANE	0.505027	0	0.505027	0	1.13053	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	3.67037	0	3.67037	0	8.21631	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.860713	0	0.860713	0	1.92675	
12 : N-OCTANE	3.12774	0	3.12774	0	7.00158	
45 : ETHYL BENZENE	0.209372	0	0.209372	0	0.468689	
43 : M-XYLENE	1.24508	0	1.24508	0	2.78717	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	2.82193	0	2.82193	0	6.31703	
14 : N-DECANE	21.7803	0	21.7803	0	48.7563	
62 : WATER	0	0	0	0	0	
Total	44.6718	0	44.6718	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.02063	0	0.02063	0	0.000398
49 : CARBON DIOXIDE	0.561737	0	0.561737	0	0.01084
2 : METHANE	1.28262	0	1.28262	0	0.024751
3 : ETHANE	10.7053	0	10.7053	0	0.206586
4 : PROPANE	51.9148	0	51.9148	0	1.00183
5 : ISOBUTANE	29.4329	0	29.4329	0	0.567984
6 : N-BUTANE	97.1143	0	97.1143	0	1.87407
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	90.7265	0	90.7265	0	1.7508
8 : N-PENTANE	126.262	0	126.262	0	2.43555
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	296.42	0	296.42	0	5.72019
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	15.5874	0	15.5874	0	0.300799
38 : CYCLOHEXANE	42.501	0	42.501	0	0.820168
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	367.764	0	367.764	0	7.09696
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	79.301	0	79.301	0	1.53032
12 : N-OCTANE	357.263	0	357.263	0	6.89431
45 : ETHYL BENZENE	22.2269	0	22.2269	0	0.428926
43 : M-XYLENE	132.178	0	132.178	0	2.55071
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	361.913	0	361.913	0	6.98405
14 : N-DECANE	3098.82	0	3098.82	0	59.7998
62 : WATER	0	0	0	0	0
Total	5182	0	5182	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.00193	0	0.00193	0	0.001649
49 : CARBON DIOXIDE	0.033444	0	0.033444	0	0.028573
2 : METHANE	0.209479	0	0.209479	0	0.17897
3 : ETHANE	0.93287	0	0.93287	0	0.797002
4 : PROPANE	3.08489	0	3.08489	0	2.63559
5 : ISOBUTANE	1.32689	0	1.32689	0	1.13364
6 : N-BUTANE	4.3781	0	4.3781	0	3.74045
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	3.29496	0	3.29496	0	2.81506
8 : N-PENTANE	4.58552	0	4.58552	0	3.91766
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	9.013	0	9.013	0	7.7003
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.522885	0	0.522885	0	0.44673
38 : CYCLOHEXANE	1.32325	0	1.32325	0	1.13053
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	9.61697	0	9.61697	0	8.21631
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	2.25521	0	2.25521	0	1.92675
12 : N-OCTANE	8.19517	0	8.19517	0	7.00158
45 : ETHYL BENZENE	0.548588	0	0.548588	0	0.468689
43 : M-XYLENE	3.26231	0	3.26231	0	2.78717
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	7.39392	0	7.39392	0	6.31703
14 : N-DECANE	57.068	0	57.068	0	48.7563
62 : WATER	0	0	0	0	0
Total	117.047	0	117.047	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.00041	0	0.00041	0	0.000353
49 : CARBON DIOXIDE	0.010957	0	0.010957	0	0.009425
2 : METHANE	0.068585	0	0.068585	0	0.05899
3 : ETHANE	0.481614	0	0.481614	0	0.41424
4 : PROPANE	1.64064	0	1.64064	0	1.41113
5 : ISOBUTANE	0.838372	0	0.838372	0	0.721091
6 : N-BUTANE	2.66615	0	2.66615	0	2.29318
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.32915	0	2.32915	0	2.00332
8 : N-PENTANE	3.20797	0	3.20797	0	2.7592
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.15792	0	7.15792	0	6.15659
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.282569	0	0.282569	0	0.24304
38 : CYCLOHEXANE	0.869828	0	0.869828	0	0.748147
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	8.56885	0	8.56885	0	7.37014
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.45851	0	1.45851	0	1.25448
12 : N-OCTANE	8.10312	0	8.10312	0	6.96956
45 : ETHYL BENZENE	0.408863	0	0.408863	0	0.351666
43 : M-XYLENE	2.43956	0	2.43956	0	2.09828
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	8.03931	0	8.03931	0	6.91468
14 : N-DECANE	67.692	0	67.692	0	58.2225
62 : WATER	0	0	0	0	0
Total	116.264	0	116.264	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	-720718.1	
Entropy	Btu/hr/R	-801.2191	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	44.6718	44.6718
Flowrate	lb/hr	5181.9953	5181.9953
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		116.0014	116.0014
Enthalpy	Btu/lbmol	-16133.6115	-16133.6115
Enthalpy	Btu/lb	-139.0812	-139.0812
Entropy	Btu/lbmol/R	-17.9357	-17.9357
Entropy	Btu/lb/R	-0.154616	-0.154616
Cp	Btu/lbmol/R		57.4199
Cp	Btu/lb/R		0.495
Cv	Btu/lbmol/R		50.5021
Cv	Btu/lb/R		0.4354
Cp/Cv			1.137
Density	lb/ft3		44.2726
Z-Factor			0.006777
Flowrate (T-P)	gal/min		14.5939
Flowrate (STP)	gal/min		14.4953
Specific Gravity	GPA STP		0.714658
Viscosity	cP		0.515961
Thermal Conductivity	Btu/hr/ft/R		0.065866
Surface Tension	dyne/cm		21.2374
Reld Vapor Pressure (ASTM-A	psia		11.05
True Vapor Pressure at 100 F	psia		19.47
Critical Temperature (Cubic E	F	599.2774	
Critical Pressure (Cubic EOS)	psia	431.1843	
Dew Point Temperature	F	308.9403	
Bubble Point Temperature	F	69.9748	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	14.7	
Latent Heat of Vaporization (N	Btu/lb	129.9117	
Latent Heat of Vaporization (P	Btu/lb	259.9742	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6307.05	
Heating Value (net)	Btu/SCF	5858.11	
Wobbe Number	Btu/SCF	2964.64	
Average Hydrogen Atoms		17.8461	
Average Carbon Atoms		8.1601	
Hydrogen to Carbon Ratio		2.187	

DESIGN II for Windows

Simulation Result:

SOLUTION REACHED

Problem:

Project:

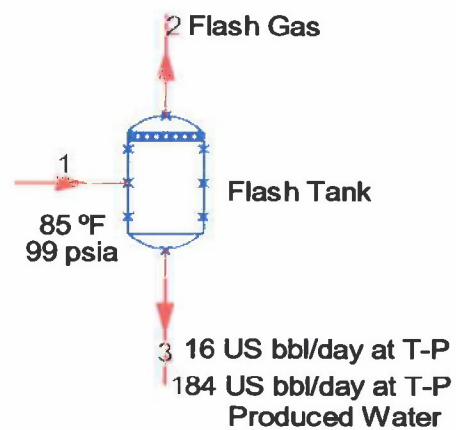
Task:

By:

At:

26-Apr-12

11:04 AM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 STEAM	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 STEAM	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000722	0	0.000462	0.00026	0.00048	76.3973
49 : CARBON DIOXIDE	0.001879	0	0.000385	0.001494	0.00125	10.619
2 : METHANE	0.031586	0	0.021934	0.009652	0.02101	30.7589
3 : ETHANE	0.031285	0	0.028974	0.002312	0.02081	5.34955
4 : PROPANE	0.054407	0	0.053051	0.001356	0.03619	1.50467
5 : ISOBUTANE	0.018943	0	0.018877	0.00006534	0.0126	0.624209
6 : N-BUTANE	0.060015	0	0.059859	0.000156	0.03992	0.468635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.288569
7 : ISOPENTANE	0.041779	0	0.041738	0.00004069	0.02779	0.175808
8 : N-PENTANE	0.057579	0	0.057535	0.00004433	0.0383	0.138973
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.07402
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.054839
52 : 2-METHYLPENTANE	0	0	0	0	0	0.049715
53 : 3-METHYLPENTANE	0	0	0	0	0	0.044482
10 : N-HEXANE	0.110453	0	0.110426	0.00002716	0.07347	0.044351
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.032828
40 : BENZENE	0.006404	0	0.006403	0.000001453	0.00426	0.040916
38 : CYCLOHEXANE	0.016176	0	0.016173	0.000003008	0.01076	0.033541
79 : 2-METHYLHEXANE	0	0	0	0	0	0.014751
80 : 3-METHYLHEXANE	0	0	0	0	0	0.014682
11 : N-HEPTANE	0.117008	0	0.116998	0.000009465	0.07783	0.01459
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.011357
41 : TOLUENE	0.027422	0	0.02742	0.000001735	0.01824	0.011414
12 : N-OCTANE	0.099493	0	0.099491	0.000002694	0.06518	0.004883
45 : ETHYL BENZENE	0.00666	0	0.00666	1.702E-07	0.00443	0.00461
43 : M-XYLENE	0.039599	0	0.039598	8.517E-07	0.02334	0.003879
42 : O-XYLENE	0	0	0	0	0	0.001809
13 : N-NONANE	0.089706	0	0.089706	8.339E-07	0.05967	0.001677
14 : N-DECANE	0.692229	0	0.692227	0.000002183	0.46045	0.000569
62 : WATER	148.834	0	0.001415	148.833	99	6.53687
Total	150.337	0	1.48933	148.848	100	

Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.020215	0	0.012928	0.007287	0.00071	
49 : CARBON DIOXIDE	0.082702	0	0.016932	0.06577	0.002903	
2 : METHANE	0.506732	0	0.351879	0.154853	0.017787	
3 : ETHANE	0.940684	0	0.871177	0.069507	0.033019	
4 : PROPANE	2.39903	0	2.33922	0.059808	0.084209	
5 : ISOBUTANE	1.10094	0	1.09714	0.003797	0.038644	
6 : N-BUTANE	3.48806	0	3.47902	0.00904	0.122435	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	3.01417	0	3.01124	0.002935	0.105801	
8 : N-PENTANE	4.15411	0	4.15091	0.003199	0.145815	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	9.51795	0	9.51561	0.00234	0.334092	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.500233	0	0.50012	0.000113	0.017559	
38 : CYCLOHEXANE	1.36133	0	1.36108	0.000253	0.047785	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	11.7239	0	11.723	0.000948	0.411525	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	2.52646	0	2.5263	0.00016	0.088682	
12 : N-OCTANE	11.3645	0	11.3642	0.000308	0.398909	
45 : ETHYL BENZENE	0.70702	0	0.707002	0.00001807	0.024817	
43 : M-XYLENE	4.20382	0	4.20373	0.00009042	0.147559	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	11.5048	0	11.5047	0.000107	0.403834	
14 : N-DECANE	98.4876	0	98.4873	0.000311	3.45704	
62 : WATER	2681.3	0	0.025495	2681.27	94.1169	
Total	2848.9	0	167.249	2681.65	100	

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.001267	0	0.001194	0.00007392	0.002746
49 : CARBON DIOXIDE	0.00142	0	0.000995	0.000425	0.003076
2 : METHANE	0.059468	0	0.056725	0.002743	0.128856
3 : ETHANE	0.075589	0	0.074932	0.000657	0.163788
4 : PROPANE	0.137586	0	0.137201	0.000385	0.298126
5 : ISOBUTANE	0.048839	0	0.04882	0.00001857	0.105826
6 : N-BUTANE	0.154853	0	0.154809	0.0000442	0.33554
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.107955	0	0.107944	0.00001156	0.233921
8 : N-PENTANE	0.14881	0	0.148798	0.0000126	0.322446
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.285592	0	0.285585	0.000007717	0.61883
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.01656	0	0.016559	4.128E-07	0.035882
38 : CYCLOHEXANE	0.041828	0	0.041828	8.547E-07	0.090635
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.302585	0	0.302582	0.00000269	0.65565
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.070914	0	0.070914	4.931E-07	0.153659
12 : N-OCTANE	0.257305	0	0.257304	7.655E-07	0.557536
45 : ETHYL BENZENE	0.017224	0	0.017224	4.837E-08	0.037321
43 : M-XYLENE	0.102409	0	0.102409	0.000000242	0.221903
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.231998	0	0.231998	0.000000237	0.5027
14 : N-DECANE	1.79025	0	1.79025	5.203E-07	3.97916
62 : WATER	42.2979	0	0.00366	42.2943	91.6524
Total	46.1504	0	3.85172	42.2986	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000402	0	0.000257	0.000145	0.000859
49 : CARBON DIOXIDE	0.001613	0	0.00033	0.001283	0.003448
2 : METHANE	0.027096	0	0.018816	0.00828	0.057912
3 : ETHANE	0.04232	0	0.039193	0.003127	0.09045
4 : PROPANE	0.075816	0	0.073926	0.00189	0.16204
5 : ISOBUTANE	0.031359	0	0.031251	0.000108	0.067024
6 : N-BUTANE	0.09576	0	0.095512	0.000248	0.204667
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.07738	0	0.077305	0.00007536	0.165384
8 : N-PENTANE	0.105544	0	0.105463	0.00008127	0.225579
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.229838	0	0.229782	0.00005651	0.491232
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.009068	0	0.009066	0.000002057	0.019381
38 : CYCLOHEXANE	0.027861	0	0.027856	0.00000518	0.059547
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.273166	0	0.273144	0.0000221	0.583835
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.046467	0	0.046464	0.00000294	0.099313
12 : N-OCTANE	0.25776	0	0.257753	0.000006979	0.550909
45 : ETHYL BENZENE	0.013006	0	0.013005	3.324E-07	0.027797
43 : M-XYLENE	0.077588	0	0.077587	0.000001669	0.165829
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.255561	0	0.255559	0.000002376	0.546209
14 : N-DECANE	2.15141	0	2.1514	0.000006784	4.59818
62 : WATER	42.9892	0	0.000409	42.9888	91.8804
Total	46.7882	0	3.78408	43.0041	100

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-2761972		
Entropy	Btu/hr/R	-4397.578		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	150.3375	1.4893	148.8481
Flowrate	lb/hr	2848.9017	167.249	2681.6527
Mole Fraction		1	0.009907	0.990093
Mass Fraction		1	0.058706	0.941294
Molecular Weight		18.95	112.2982	18.016
Enthalpy	Btu/lbmol	-18371.8148	-14752.178	-18408.0317
Enthalpy	Btu/lb	-969.4866	-131.3661	-1021.7584
Entropy	Btu/lbmol/R	-29.2514	-15.8869	-29.3851
Entropy	Btu/lb/R	-1.5436	-0.141471	-1.6311
Cp	Btu/lbmol/R		56.9172	17.9928
Cp	Btu/lb/R		0.5068	0.9987
Cv	Btu/lbmol/R		49.8785	17.7287
Cv	Btu/lb/R		0.4442	0.984
Cp/Cv			1.1411	1.0149
Density	lb/ft3		43.4219	63.3981
Z-Factor			0.043675	0.004799
Flowrate (T-P)	gal/min		0.480246	5.2739
Flowrate (STP)	gal/min		0.471781	5.3616
Specific Gravity	GPA STP		0.708682	0.999863
Viscosity	cP		0.535142	0.807243
Thermal Conductivity	Btu/hr/ft/R		0.067989	0.355244
Surface Tension	dyne/cm		19.4988	71.2853
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		73.11	
Critical Temperature (Cubic E	F	695.2244		
Critical Pressure (Cubic EOS)	psia	3254.5678		
Dew Point Temperature	F	322.9413		
Bubble Point Temperature	F	152.3111		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.9059		
Stream Vapor Pressure	psia	66.7783		
Latent Heat of Vaporization (N	Btu/lb	857.1977		
Latent Heat of Vaporization (P	Btu/lb	1091.036		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.65		
Heating Value (net)	Btu/SCF	56.32		
Wobbe Number	Btu/SCF	74.37		
Average Hydrogen Atoms		2.1521		
Average Carbon Atoms		0.0783		
Hydrogen to Carbon Ratio		27.4733		

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000683	0.000683	0.00001636	0	0.827733	506.086
49 : CARBON DIOXIDE	0.000754	0.000754	0.000148	0	0.913919	61.6028
2 : METHANE	0.027929	0.027929	0.001745	0	33.839	193.912
3 : ETHANE	0.019292	0.019292	0.007808	0	23.3751	29.9379
4 : PROPANE	0.016523	0.016523	0.025989	0	20.0193	7.70283
5 : ISOBUTANE	0.00281	0.00281	0.011335	0	3.40413	3.00307
6 : N-BUTANE	0.006818	0.006818	0.037403	0	8.26093	2.20861
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.00179	0.00179	0.028151	0	2.16904	0.770489
8 : N-PENTANE	0.001936	0.001936	0.039178	0	2.34525	0.59861
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.001121	0.001121	0.077008	0	1.3584	0.176398
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.00006156	0.00006156	0.004468	0	0.074586	0.166949
38 : CYCLOHEXANE	0.000125	0.000125	0.011306	0	0.151666	0.134146
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.000361	0.000361	0.082169	0	0.43739	0.053231
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.00006778	0.00006778	0.019269	0	0.082123	0.04262
12 : N-OCTANE	0.00009496	0.00009496	0.070021	0	0.115056	0.016432
45 : ETHYL BENZENE	0.000006185	0.000006185	0.004687	0	0.007494	0.015987
43 : M-XYLENE	0.00003076	0.00003076	0.027874	0	0.037266	0.01337
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.00002711	0.00002711	0.063175	0	0.032852	0.0052
14 : N-DECANE	0.00006525	0.00006525	0.487599	0	0.079056	0.001621
62 : WATER	0.002038	0.002038	0.00005	0	2.46969	37.9643
Total	0.082534	0.082534	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.019138	0.019138	0.000004	0	0.670084
49 : CARBON DIOXIDE	0.033195	0.033195	0.000056	0	1.16231
2 : METHANE	0.448058	0.448058	0.000241	0	15.6883
3 : ETHANE	0.580082	0.580082	0.002024	0	20.311
4 : PROPANE	0.728548	0.728548	0.00988	0	25.5094
5 : ISOBUTANE	0.163291	0.163291	0.00568	0	5.71748
6 : N-BUTANE	0.396264	0.396264	0.01874	0	13.8748
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.129155	0.129155	0.01751	0	4.52223
8 : N-PENTANE	0.139647	0.139647	0.02437	0	4.88961
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.096611	0.096611	0.05721	0	3.38273
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.004808	0.004808	0.003008	0	0.168355
38 : CYCLOHEXANE	0.010534	0.010534	0.008203	0	0.368848
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.036171	0.036171	0.07098	0	1.26649
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.006245	0.006245	0.01531	0	0.218654
12 : N-OCTANE	0.010847	0.010847	0.06895	0	0.379788
45 : ETHYL BENZENE	0.000657	0.000657	0.00429	0	0.022989
43 : M-XYLENE	0.003265	0.003265	0.02551	0	0.114327
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.003477	0.003477	0.06985	0	0.121758
14 : N-DECANE	0.009283	0.009283	0.5981	0	0.325042
62 : WATER	0.036721	0.036721	0.000101	0	1.28575
Total	2.856	2.856	1	0	100
Total VOC		1.775524			

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.261695	0.261695	0	0	0.827733
49 : CARBON DIOXIDE	0.288944	0.288944	0	0	0.913919
2 : METHANE	10.6985	10.6985	0	0	33.839
3 : ETHANE	7.39026	7.39026	0	0	23.3751
4 : PROPANE	6.32927	6.32927	0	0	20.0193
5 : ISOBUTANE	1.07625	1.07625	0	0	3.40413
6 : N-BUTANE	2.61177	2.61177	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.685761	0.685761	0	0	2.16904
8 : N-PENTANE	0.741471	0.741471	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.429471	0.429471	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.023581	0.023581	0	0	0.074586
38 : CYCLOHEXANE	0.047951	0.047951	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.138285	0.138285	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.025964	0.025964	0	0	0.082123
12 : N-OCTANE	0.036376	0.036376	0	0	0.115056
45 : ETHYL BENZENE	0.002369	0.002369	0	0	0.007494
43 : M-XYLENE	0.011782	0.011782	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.010387	0.010387	0	0	0.032852
14 : N-DECANE	0.024994	0.024994	0	0	0.079056
62 : WATER	0.780813	0.780813	0	0	2.46969
Total	31.6159	31.6159	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.259247	0.259247	0	0	0.827733
49 : CARBON DIOXIDE	0.28624	0.28624	0	0	0.913919
2 : METHANE	10.5984	10.5984	0	0	33.839
3 : ETHANE	7.32111	7.32111	0	0	23.3751
4 : PROPANE	6.27006	6.27006	0	0	20.0193
5 : ISOBUTANE	1.06618	1.06618	0	0	3.40413
6 : N-BUTANE	2.58733	2.58733	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.679345	0.679345	0	0	2.16904
8 : N-PENTANE	0.734534	0.734534	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.425453	0.425453	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.02336	0.02336	0	0	0.074586
38 : CYCLOHEXANE	0.047502	0.047502	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.136991	0.136991	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.025721	0.025721	0	0	0.082123
12 : N-OCTANE	0.036036	0.036036	0	0	0.115056
45 : ETHYL BENZENE	0.002347	0.002347	0	0	0.007494
43 : M-XYLENE	0.011672	0.011672	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.010289	0.010289	0	0	0.032852
14 : N-DECANE	0.02476	0.02476	0	0	0.079056
62 : WATER	0.773508	0.773508	0	0	2.46969
Total	31.3201	31.3201	0	0	100

Properties

Temperature	F	70
Pressure	psia	14.7
Enthalpy	Btu/hr	41.70611
Entropy	Btu/hr/R	0.3814897
Vapor Fraction		1

		Total	Vapor
Flowrate	lbmol/hr	0.082534	0.082534
Flowrate	lb/hr	2.856	2.856
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.6041	34.6041
Enthalpy	Btu/lbmol	505.323	505.323
Enthalpy	Btu/lb	14.603	14.603
Entropy	Btu/lbmol/R	4.6222	4.6222
Entropy	Btu/lb/R	0.133575	0.133575
Cp	Btu/lbmol/R		14.5338
Cp	Btu/lb/R		0.42
Cv	Btu/lbmol/R		12.4782
Cv	Btu/lb/R		0.3605
Cp/Cv			1.1649
Density	lb/ft3		0.090334
Z-Factor			0.990803
Flowrate (T-P)	ft3/s		0.008782
Flowrate (STP)	MMSCFD		0.0007517
Viscosity	cP		0.009488
Thermal Conductivity	Btu/hr/ft/R		0.012672
Critical Temperature (Cubic E)	F	183.9023	
Critical Pressure (Cubic EOS)	psia	1379.435	
Dew Point Temperature	F	69.9999	
Bubble Point Temperature	F	-259.9682	
Water Dew Point	F	71.5716	
Stream Vapor Pressure	psia	1136.0205	
Vapor Sonic Velocity	ft/s	931.68	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1940.02	
Heating Value (net)	Btu/SCF	1778.92	
Wobbe Number	Btu/SCF	1764.79	
Average Hydrogen Atoms		6.4538	
Average Carbon Atoms		2.263	
Hydrogen to Carbon Ratio		2.8518	
Methane Number		41.76	
Motor Octane Number		99.05	

Details for Stream 3

Stream 3 (Produced Water)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 STEAM	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 STEAM	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00003846	0	0.00002322	0.00001524	0.0000256	
49 : CARBON DIOXIDE	0.001125	0	0.000211	0.000914	0.000749	
2 : METHANE	0.003657	0	0.002477	0.00118	0.002434	
3 : ETHANE	0.011993	0	0.011084	0.000909	0.007982	
4 : PROPANE	0.037885	0	0.036893	0.000992	0.025213	
5 : ISOBUTANE	0.016133	0	0.016091	0.00004187	0.010737	
6 : N-BUTANE	0.053197	0	0.053095	0.000102	0.035404	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	0.039989	0	0.039962	0.00002668	0.026614	
8 : N-PENTANE	0.055644	0	0.055615	0.00002884	0.037033	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.109332	0	0.109315	0.00001671	0.072764	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.006343	0	0.006342	9.173E-07	0.004221	
38 : CYCLOHEXANE	0.016051	0	0.016049	0.000001865	0.010683	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	0.116647	0	0.116641	0.000005379	0.077633	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.027354	0	0.027353	0.00000101	0.018205	
12 : N-OCTANE	0.099398	0	0.099397	0.000001415	0.066153	
45 : ETHYL BENZENE	0.006654	0	0.006654	9.216E-08	0.004428	
43 : M-XYLENE	0.039568	0	0.039568	4.583E-07	0.026334	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.089679	0	0.089679	0.000000404	0.059685	
14 : N-DECANE	0.692164	0	0.692163	9.723E-07	0.46066	
62 : WATER	148.832	0	0.000923	148.831	99.053	
Total	150.255	0	1.41953	148.835	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.001077	0	0.00065	0.000427	0.00003786	
49 : CARBON DIOXIDE	0.049507	0	0.009268	0.040239	0.001739	
2 : METHANE	0.058675	0	0.039741	0.018933	0.002062	
3 : ETHANE	0.360603	0	0.33326	0.027343	0.01267	
4 : PROPANE	1.67048	0	1.62676	0.043722	0.058695	
5 : ISOBUTANE	0.937649	0	0.935215	0.002433	0.032946	
6 : N-BUTANE	3.09179	0	3.08589	0.005905	0.108635	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	2.88502	0	2.88309	0.001925	0.101369	
8 : N-PENTANE	4.01447	0	4.01239	0.002081	0.141054	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	9.42134	0	9.4199	0.00144	0.331033	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.495425	0	0.495353	0.00007165	0.017407	
38 : CYCLOHEXANE	1.3508	0	1.35064	0.000157	0.047462	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	11.6878	0	11.6872	0.000539	0.410667	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	2.52021	0	2.52012	0.00009305	0.088551	
12 : N-OCTANE	11.3537	0	11.3535	0.000162	0.398928	
45 : ETHYL BENZENE	0.706364	0	0.706354	0.000009783	0.024819	
43 : M-XYLENE	4.20055	0	4.20051	0.00004865	0.147593	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	11.5014	0	11.5013	0.00005182	0.404117	
14 : N-DECANE	98.4783	0	98.4782	0.000138	3.46018	
62 : WATER	2681.26	0	0.016627	2681.24	94.21	
Total	2846.05	0	164.656	2681.39	100	

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.00006522	0	0.00006081	0.000004408	0.000139
49 : CARBON DIOXIDE	0.000816	0	0.000552	0.000264	0.001745
2 : METHANE	0.00683	0	0.006489	0.000341	0.014608
3 : ETHANE	0.029295	0	0.029032	0.000263	0.062656
4 : PROPANE	0.096924	0	0.096637	0.000287	0.207299
5 : ISOBUTANE	0.042161	0	0.042149	0.00001211	0.090173
6 : N-BUTANE	0.139106	0	0.139077	0.00002938	0.297517
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.104684	0	0.104676	0.000007714	0.223895
8 : N-PENTANE	0.145685	0	0.145677	0.00000834	0.311589
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.286344	0	0.286339	0.000004831	0.612426
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.016612	0	0.016612	2.652E-07	0.03553
38 : CYCLOHEXANE	0.04204	0	0.042039	5.394E-07	0.089914
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.30553	0	0.305529	0.000001555	0.653463
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.071648	0	0.071648	0.000000292	0.153239
12 : N-OCTANE	0.26036	0	0.260359	4.092E-07	0.556853
45 : ETHYL BENZENE	0.017429	0	0.017429	2.665E-08	0.037276
43 : M-XYLENE	0.103643	0	0.103643	1.325E-07	0.22167
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.234904	0	0.234904	1.168E-07	0.502408
14 : N-DECANE	1.81304	0	1.81304	2.811E-07	3.8777
62 : WATER	43.0385	0	0.002418	43.0361	92.0499
Total	46.7556	0	3.71831	43.0373	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.00002141	0	0.00001292	0.000008487	0.00004586
49 : CARBON DIOXIDE	0.000966	0	0.000181	0.000785	0.002068
2 : METHANE	0.003137	0	0.002125	0.001012	0.00672
3 : ETHANE	0.016223	0	0.014993	0.00123	0.034748
4 : PROPANE	0.052792	0	0.05141	0.001382	0.113076
5 : ISOBUTANE	0.026708	0	0.026639	0.00006931	0.057207
6 : N-BUTANE	0.084881	0	0.084719	0.000162	0.181809
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.074065	0	0.074015	0.00004941	0.158641
8 : N-PENTANE	0.101996	0	0.101943	0.00005287	0.218469
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.227505	0	0.227471	0.00003476	0.4873
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.008981	0	0.00898	0.000001299	0.019237
38 : CYCLOHEXANE	0.027646	0	0.027642	0.000003213	0.059215
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.272323	0	0.27231	0.00001256	0.583296
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.046352	0	0.04635	0.000001711	0.099282
12 : N-OCTANE	0.257514	0	0.257511	0.000003666	0.551577
45 : ETHYL BENZENE	0.012994	0	0.012993	0.00000018	0.027831
43 : M-XYLENE	0.077528	0	0.077527	0.000000898	0.16606
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.255484	0	0.255483	0.000001151	0.547229
14 : N-DECANE	2.1512	0	2.1512	0.000003022	4.60772
62 : WATER	42.9886	0	0.000267	42.9883	92.0785
Total	46.6869	0	3.69377	42.9931	100

Properties

Temperature	F	70		
Pressure	psia	14.7		
Enthalpy	Btu/hr	-2803701		
Entropy	Btu/hr/R	-4474.077		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	150.2549	1.4195	148.8354
Flowrate	lb/hr	2846.0457	164.656	2681.3897
Mole Fraction		1	0.009448	0.990552
Mass Fraction		1	0.057854	0.942146
Molecular Weight		18.9414	115.993	18.0158
Enthalpy	Btu/lbmol	-18659.6272	-16137.915	-18683.6783
Enthalpy	Btu/lb	-985.1216	-139.1284	-1037.0714
Entropy	Btu/lbmol/R	-29.7766	-17.9358	-29.8895
Entropy	Btu/lb/R	-1.572	-0.154628	-1.6591
Cp	Btu/lbmol/R		57.5519	17.9991
Cp	Btu/lb/R		0.4962	0.9991
Cv	Btu/lbmol/R		50.6338	17.8638
Cv	Btu/lb/R		0.4365	0.9916
Cp/Cv			1.1366	1.0076
Density	lb/ft3		44.2825	62.3039
Z-Factor			0.006775	0.0007479
Flowrate (T-P)	gal/min		0.463611	5.366
Flowrate (STP)	gal/min		0.460522	5.3602
Specific Gravity	GPA STP		0.714752	1
Viscosity	cP		0.555862	0.975963
Thermal Conductivity	Btu/hr/ft/R		0.065905	0.346918
Surface Tension	dyne/cm		21.2845	72.5713
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		20.13	
Critical Temperature (Cubic E)	F	695.4634		
Critical Pressure (Cubic EOS)	psia	3249.6418		
Dew Point Temperature	F	211.5525		
Bubble Point Temperature	F	70.2894		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (N)	Btu/lb	925.8833		
Latent Heat of Vaporization (P)	Btu/lb	1063.375		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	59.62		
Heating Value (net)	Btu/SCF	55.37		
Wobbe Number	Btu/SCF	73.12		
Average Hydrogen Atoms		2.1498		
Average Carbon Atoms		0.0771		
Hydrogen to Carbon Ratio		27.8701		

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-AF
City:	Corpus Christi
State:	Texas
Company:	
Type of Tank:	Horizontal Tank
Description:	300 Gal Antifreeze Tank

Tank Dimensions

Shell Length (ft):	6.00
Diameter (ft):	3.00
Volume (gallons):	300.00
Turnovers:	12.00
Net Throughput(gal/yr):	3,600.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Corpus Christi, Texas (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TK-AF - Horizontal Tank
Corpus Christi, Texas

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Methyl alcohol	Alt	73.50	68.36	76.64	71.57	2.1786	1.8675	2.5329	32.0490			32.04	Option 2: A=7.887, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TK-AF - Horizontal Tank
Corpus Christi, Texas

Annual Emission Calculations

Standing Losses (lb):	8.0050
Vapor Space Volume (cu ft):	27.0137
Vapor Density (lb/cu ft):	0.0122
Vapor Space Expansion Factor:	0.0869
Vented Vapor Saturation Factor:	0.8524
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	27.0137
Tank Diameter (ft):	3.0000
Effective Diameter (ft):	4.7885
Vapor Space Outage (ft):	1.5000
Tank Shell Length (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0122
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.1786
Daily Avg. Liquid Surface Temp. (deg. R):	533.1716
Daily Average Ambient Temp. (deg. F):	71.5458
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	531.2358
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sq ft day):	1,447.9410
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0869
Daily Vapor Temperature Range (deg. R):	20.5542
Daily Vapor Pressure Range (psia):	0.6654
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.1786
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	1.8675
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.5329
Daily Avg. Liquid Surface Temp. (deg R):	533.1716
Daily Min. Liquid Surface Temp. (deg R):	528.0331
Daily Max. Liquid Surface Temp. (deg R):	538.3102
Daily Ambient Temp. Range (deg. R):	18.9750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8524
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.1786
Vapor Space Outage (ft):	1.5000
Working Losses (lb):	5.9832
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.1786
Annual Net Throughput (gal/yr.):	3,600.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	14.8921

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-AF - Horizontal Tank
Corpus Christi, Texas

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	5.98	8.91	14.89

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-LO
City:	Corpus Christi
State:	Texas
Company:	
Type of Tank:	Horizontal Tank
Description:	500 Gal Lube Oil Tank

Tank Dimensions

Shell Length (ft):	6.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	12.00
Net Throughput(gal/yr):	6,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Corpus Christi, Texas (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TK-LO - Horizontal Tank
Corpus Christi, Texas

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
LUBE OIL	All	73.50	68.36	78.64	71.57	0.0001	0.0001	0.0001	190.0000			387.00	Option 1: VP70 = .0001 VP80 = .0001

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TK-LO - Horizontal Tank
Corpus Christi, Texas

Annual Emission Calculations

Standing Losses (lb):	0.0020
Vapor Space Volume (cu ft):	48.0243
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0345
Vented Vapor Saturation Factor:	1.0000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	48.0243
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.5293
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	190.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0001
Daily Avg. Liquid Surface Temp. (deg. R):	533.1716
Daily Average Ambient Temp. (deg. F):	71.5458
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	531.2358
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sq ft day):	1,447.9410
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0345
Daily Vapor Temperature Range (deg. R):	20.5542
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0001
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0001
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0001
Daily Avg. Liquid Surface Temp. (deg R):	533.1716
Daily Min. Liquid Surface Temp. (deg R):	528.0331
Daily Max. Liquid Surface Temp. (deg R):	538.3102
Daily Ambient Temp. Range (deg. R):	18.9750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	1.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0001
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.0027
Vapor Molecular Weight (lb/lb-mole):	190.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0001
Annual Net Throughput (gal/yr.):	6,000.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0047

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-LO - Horizontal Tank
Corpus Christi, Texas

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
LUBE OIL	0.00	0.00	0.00

**ATTACHMENT 4
REGULATORY APPLICABILITY**

OIL AND GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB – BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 4 REGULATORY APPLICABILITY

Burlington Resources Oil & Gas Company LP (Burlington) is submitting this Oil and Gas Standard Permit (SP) Registration to authorize Sugarloaf Central facility 1 (the Site). The Site will include two (2) compressor engines and associated blowdown and starter vent events, one (1) glycol dehydration unit, nine (9) controlled atmospheric condensate storage tanks and associated loading, ten (10) controlled atmospheric produced water storage tanks and associated loading, one (1) controlled atmospheric slop storage tank and associated loading, one (1) vapor recovery unit (VRU) combustion control device, three (3) flare combustion control devices, atmospheric chemical and lube oil storage tanks and piping and fugitive components. The following paragraphs address the Site's compliance with each of the applicable SP requirements. A copy of this SP is located in Attachment 6 of this SP registration.

Non-Rule Air Quality Standard Permit for Oil and Gas Handling and Production Facilities, effective February 27, 2011.

SP (a)(1)

This rule states that the requirements in paragraphs (a)-(k) of this standard permit are applicable to projects located in the Barnett Shale (Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise Counties) on or after April 1, 2011. For all other projects and dependent facilities, 30 TAC 116.620 is applicable.

The Site is located in Live Oak County and is therefore not required to meet this SP. However, Burlington has opted to meet the Non-Rule Air Quality Standard Permit voluntarily.

SP (a)(2)

This rule states that only one Air Quality Standard Permit for Oil and Gas Handling and Production Facilities for an oil and gas site (OGS) may be registered for a combination of dependent facilities, and may not be used if operationally dependent facilities are authorized by the permit by rule in 30 TAC 106.352 or 116.111. Existing authorized facilities which are not changing certified character or quantity of emissions must only meet subsections (i) and (k) of this standard permit.

All facilities at the Site are included in this SP registration, in accordance with this rule.

SP (a)(3)

This rule does not relieve the owner or operator from complying with any other applicable provision of the Texas Health and Safety Code, Texas Water Code, rules of the Texas Commission on Environmental Quality (TCEQ), or any additional local, state, or federal regulations.

Burlington will comply with the applicable provisions of these regulations.

SP (a)(4)

This rule states that emissions from upsets, emergencies, or malfunctions are not authorized by this standard permit. This standard permit does not regulate methane, ethane, or carbon dioxide.

This SP registration does not include emissions from upset, emergency, or malfunction events. If any such emission events occur, Burlington Resources will manage them in accordance with 30 TAC Chapter 101.

SP (b)(1)-(8)

These rules state the definitions and scope of a Facility, Receptors, and OGS. The rules also state that the definitions of 30 TAC §122.10 relating to the Federal Operating Permits program apply. A project is defined as any new facility or group of operationally dependent facilities at an OGS or physical or operational changes to existing authorized facilities which increase the potential to emit over previously certified limits and must meet all requirements of this standard permit prior to construction or implementation of changes, including an impacts analysis as specified in paragraph (k) of this SP.

This permit application was completed according to the definitions and scope laid out in these rules.

SP (c)(1)

This rule states that existing OGS which are authorized by previous versions of this Standard Permit require registration unless the Project can meet exceptions listed in this requirement.

This Site was not authorized under a previous SP; therefore, this rule does not apply.

SP (c)(2)(A)

This rule states that new, changed, or replacement facilities shall not exceed the thresholds for major source or major modification as defined in 30 TAC §116.12 (Nonattainment and Prevention of Significant Deterioration Review Definitions), and in Federal Clean Air Act, §112(g) or §112(j);

The Site is located in Live Oak County which is an attainment county. The Site is a new project and emission totals for the Site do not exceed the thresholds for a major source. Therefore the requirements of this rule have been met.

SP (c)(2)(B)

This rule states that all facilities shall comply with all applicable 40 Code of Federal Regulations (CFR), Parts 60, 61, and 63 requirements for New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and Maximum Achievable Control Technology (MACT).

NSPS Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984 does not apply to the Site's storage tanks due to their capacities and since the condensate is only stored prior to custody transfer.

NSPS KKK – Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants do not apply since the Site is not a natural gas processing plant.

NSPS LLL – Standards of Performance for Onshore Natural Gas Processing: SO₂ Emissions does not apply since the Site does not have a sweetening unit or sweetening unit followed by a sulfur recovery unit.

MACT Subpart ZZZZ- COMP-01 is a new RICE because it was constructed after June 12, 2006. According to §63.6590(c)(1) in the amended regulation, new Spark Ignited Rice must meet the requirements of this part by meeting the requirements of NSPS JJJJ. COMP-02 is an existing RICE because it was constructed before June 12, 2006. According to §63.6603 in the regulation finalized January 15, 2013, existing Spark Ignited Rice with a maximum engine power ≥ 500 HP at remote area sources are required to meet operational and maintenance requirements. COMP-02 will meet these requirements.

NSPS Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines became effective June 28, 2011. According to Title 40 of the Code of Federal Regulations (40 CFR) §60.4230(a)(4)(ii), spark ignition lean burn internal combustion engines with a maximum engine power ≥ 500 HP and ≤ 1350 HP manufactured after January 1, 2008, respectively, are subject to these standards. COMP-01 is subject to this rule and will meet the maintenance and emission limit requirements outlined in the rule text.

MACT Subpart HH - National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities. According to 40 CFR §63.764(e)(1)(ii), since the actual average emissions of benzene from the glycol dehydration unit are below 0.9 megagram per year the unit is subject to limited requirements in this rule. These requirements include keeping on-site records of benzene emission determinations and the natural gas flowrates for the dehydration unit.

The Site is not subject to any Hazardous Air Pollutant (HAP) control requirements listed in 40 CFR Part 61. The Site is not subject to any maximum achievable control requirements listed in 40 CFR Part 63.

SP (c)(2)(D)

This rule states that all facilities shall comply with all applicable requirements of 30 TAC Chapters 111 (Control of Air Pollution from Visible Emissions and Particulate Matter), 112 (Control of Air Pollution from Sulfur Compounds), 113 (Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants), 115 (Control of Air Pollution from Volatile Organic Compounds), and 117 (Control of Air Pollution from Nitrogen Compounds).

Explanations of compliance are provided for all applicable rules.

30 TAC Chapter 111 - Control of Air Pollution from Visible Emissions and Particulate Matter
Flare control devices found at the site will meet the visible emission requirements listed in 30 TAC 111.111(a)(4). This includes stipulations on visible emissions allowed during periods of time during normal operations.

30 TAC Chapter 112 - Control of Air Pollution from Sulfur Compounds regulates controls needed on emissions related to sulfur compounds. The liquids and gases handled on site do not emit over the prescribed rates.

30 TAC Chapter 113 - Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants addresses the control of hazardous air pollutant (HAP) emissions from designated facilities defined within this chapter including municipal solid waste landfills (MSWLFs), medical waste incinerators, and certain other processes/emissions regulated under 40 CFR Parts 61 and 63. The Site will not generate radionuclide emissions and will not include a MSWLF or medical waste incinerator. Consequently, Subchapters B and D are not applicable. The applicability of Subchapter C of this rule, which implements 40 CFR Part 63 by regulating

HAP emissions released from source categories, is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC Chapter 115 - Control of Air Pollution from Volatile Organic Compounds regulates VOC emissions according to source type and Site location (county). The Site is located in Live Oak County which is considered a covered attainment county. However, the equipment at the Site is exempt from this rule because it does not meet the requirements set forth for applicability for covered attainment counties.

30 TAC Chapter 117 - Control of Air Pollution from Nitrogen Compounds includes regulations for major sources of NO_x in ozone nonattainment areas. The Site is located in Live Oak County, which is not listed in the counties of interest as mentioned in this rule text. NO_x emitting sources at the Site are exempt from this rule and its requirements.

SP (c)(3)

This rule states that in order to be eligible for this Standard Permit, an applicant:

- (A) shall meet all applicable requirements as set forth in this standard permit;
- (B) shall not misrepresent all relevant facts in obtaining the permit; and
- (C) shall not be indebted to the state for failure to make payment of penalties or taxes imposed by the commission's jurisdiction.

Burlington will comply with the requirements listed in this rule.

SP (c)(4)(A-D)

All facilities related to the operation of any OGS, under any version of this standard permit (or co-located at a site with an OGS standard permit), previously authorized by permit by rule under 30 TAC Chapter 106 must be incorporated into this standard permit (previous authorizations will be voided), meet all emission limits established by this standard permit and review in accordance with paragraph (b)(8), and meet the requirements of paragraphs (e), (i), and (j) of this standard permit. The requirements in paragraph (h) (BACT) of this standard permit must be met if facilities are changed to increase the potential to emit.

The Site is currently registered under PBR Permit Number 87632. All facilities from that permit are included in this application. Upon the approval of this application please void the previous PBR permit. The Site was not previously authorized under any Standard Permits and will meet the requirements of this rule.

SP (d)

This rule lists the specific facilities that have been evaluated for standard permit registration, as well as facilities that are not authorized under standard permit.

The Site does not include any of the facilities listed in the exclusions list of this rule. Additionally, all the facilities located at the Site are listed in the approved facilities list of this rule. Therefore, the requirements of this rule will be met.

SP (e)(1)

All facilities which have the potential to emit air contaminants must be maintained in good working order and operated properly during facility operations. Each operator shall establish and maintain a program to replace, repair, and/or maintain facilities to keep them in good working order. The minimum requirements of this program shall include:

- (A) Compliance with manufacturer's specifications and recommended programs;
- (B) cleaning and routine inspection of all equipment; and
- (C) replacement and repair of equipment on schedules which prevent equipment failures and maintain performance.

Burlington will comply with the requirements of this rule.

SP (e)(2)

This rule states that any facility shall be operated at least 50 feet from any property line or receptor (whichever is closer to the facility). This distance limitation does not apply to the following:

- (A) any fugitive components that are used for isolation and/or safety purposes may be located at 1/2 of the width of any applicable easement;
- (B) any facility at a location for which the distance requirements were satisfied at the time this section is claimed, registered, or certified (provided that the authorization was maintained) regardless of whether a receptor is subsequently built or put to use 50 feet from any OGS facility; or
- (C) existing facilities which are located less than 50 feet from a property line or receptor when constructed and previously authorized. If modified or replaced the operator shall consider, to the extent that good engineering practice will permit, moving these facilities to meet the 50-foot requirement. Replacement facilities must meet all other requirements of this section.

The Site will satisfy the 50-foot requirement.

SP (e)(3)

This rule states that engines and turbines shall meet the emission and performance standards listed in Table 6 and the following requirements:

- (A) liquid fueled engines used for back-up power generation and periodic power needs at the OGS are authorized if the fuel has no more than 0.05% sulfur and the engine is operated less than 876 hours per rolling 12-month period;
- (B) engines and turbines used for electric generation more than 876 hours per rolling 12-month period are authorized if no reliable electric service is readily available and 30 TAC §106.352(m) Table 6 is met. In all other circumstances, electric generators must meet the technical requirements of the Air Quality Standard Permit for Electric Generating Unit (EGU) and the emissions shall be included in the registration under this section;
- (C) all applicable requirements of Chapter 117 of this title (relating to Control of Air Pollution from Nitrogen Compounds);
- (D) all applicable requirements of 40 CFR Parts 60 and 63; and
- (E) compression ignition engines that are rated less than 225 kilowatts (300 hp) and emit less than or equal to the emission tier for an equivalent-sized model year 2008 non-road compression ignition engine located at 40 CFR §89.112, Table 1 are authorized.

Burlington will comply with this section.

SP (e)(4)

This rule states that open-topped tanks or ponds containing VOCs or H₂S are allowed up to a potential to emit equal to 1.0 tpy of VOC and 0.1 tpy of H₂S.

This Site does not involve open-topped tanks or ponds containing VOCs or H₂S. Therefore, this rule does not apply.

SP (e)(5)

All process equipment and storage facilities individually must meet the requirements of BACT listed in Table 10 in paragraph (m). Any combination of process equipment and storage facilities with an uncontrolled PTE of equal to or greater than 25 tpy of VOC must also meet the requirements of Table 10, row titled "Combined Control Requirements". All of the following streams and facilities must be included for this site-wide assessment:

- (A) For any gaseous vent stream with a concentration of 1% VOC must be considered for capture and control requirements;
- (B) For any liquid stream with a potential to emit of equal to or greater than 1 tpy VOC for each vessel or storage facility.

The equipment at the Site will meet the requirements of this rule.

SP (e)(6)

This rule includes requirements for fugitive components based upon the total site fugitive emissions. If the site is subject to LDAR control program, the requirements outlined in Table 9 must be followed.

The emissions represented in this application are done so in accordance with this rule. This Site is not required to utilize the LDAR control program.

SP (e)(7)

This rule states requirements for tanks and vessels that use a paint color to minimize the effects of solar heating. Solar absorptance should be 0.43 or less, as referenced in AP-42 Table 7.1 – 6 and paint shall be applied in sufficient quantity as to be considered solar resistant. Paint coatings shall be maintained in good condition and will not compromise tank integrity. Minimal amounts of rust may be present not to exceed 10% of the external surface area of the roof or walls of the tank and in no way may compromise tank integrity.

The Site includes a number of liquid storage tanks which will comply with the requirements of this rule.

SP (e)(8)

This rule states that all emission estimation methods including computer programs must be used with monitoring data generated in accordance with Table 8 in section (m). All emission estimation methods must also be used in a way that are consistent with protocols established by the commission or promulgated in federal regulations (NSPS, NESHAPS). Where control is relied upon to meet paragraph (k) (emission limits based on impact evaluation), control monitoring is required.

The Site will comply with all applicable monitoring and record demonstration requirements, and all emission estimation methods will comply with the requirements of this rule.

SP (e)(9)

This rule states that process reboilers, heaters, and furnaces that are also used for control of waste gas streams:

- (A) may claim 50% to 99% destruction efficiency for VOCs and H₂S depending on the design and level of monitoring applied. The 90% destruction may be claimed where the waste gas is delivered to the flame zone or combustion fire box with basic monitoring as specified in 30 TAC §106.352(j). Any value greater than 90% and up to 99% destruction efficiency may be claimed where enhanced monitoring and/or testing are applied as specified in 30 TAC §106.352(j);
- (B) if the waste gas is premixed with the primary fuel gas and used as the primary fuel in the device through the primary fuel burners, 99% destruction may be claimed with basic monitoring as specified in 30 TAC §106.352(j);
- (C) in systems where the combustion device is designed to cycle on and off, records of run time and enhanced monitoring are required to claim any run time beyond 50%.

There are no heaters at the Site; therefore, this rule does not apply.

SP (e)(10)

This rule states that Vapor Recovery Systems (VRSs) may claim up to 100% control. The VRUs must meet the appropriate design, monitoring, and recordkeeping in subsection (m) Table 7 and Table 8.

The Site has a VRU and is claiming 100% control. The VRU will meet the appropriate design, monitoring, and recordkeeping requirements in subsection (m) Tables 7 and 8.

SP (e)(11)

This rule includes design parameters that are required of flare combustion control devices in order to be able to claim a 98% destruction efficiency of 98% for VOCs and H₂S and 99% for VOCs containing no more than three carbon atoms that contain no elements other than carbon and hydrogen.

The Site has three flare combustion control devices and is claiming a destruction efficiency of 98%. The Site will meet the design parameters required for this destruction efficiency.

SP (e)(12)

This rule establishes the design destruction efficiency that thermal oxidation and vapor combustion control devices may claim, depending on the design and level of monitoring applied, variability of waste gas streams to control, and stack testing.

The Site does not involve the use of thermal oxidizers; therefore, this rule does not apply.

SP (f)(1)

This rule states that for all previous claims of this standard permit (or previous version of this standard permit) existing authorized facilities, or group of facilities, are not required to meet the requirements of this standard permit, with the exception of planned MSS, until a renewal under the standard permit is submitted after December 31, 2015.

The Site is not an existing authorized facility under a previous version of the SP; therefore, this rule does not apply.

SP (f)(2)

This rule states that if no other changes, except for authorizing planned MSS, occur at an existing site under this standard permit, or any previous version of this standard permit, paragraph (b)(7) applies.

- (A) Records demonstrating compliance Paragraph (i) must be kept;
- (B) If the OGS must certify emissions to establish nonapplicability of prevention of significant deterioration (PSD), nonattainment new source review (NNSR), or the federal operating permits program, this certification may be filed using form APD-CERT. No fee is required for this certification;
- (C) Planned MSS shall be incorporated at the next revision or update to a registration under this standard permit after January 5, 2012, and no later than any renewal submitted after December 31, 2015.

The Site is not an existing authorized facility under this SP or a previous version of the SP; therefore, this rule does not apply.

SP (f)(3)

This rule states that facilities, groups of facilities or planned MSS from facilities registered under this standard permit cannot be authorized by a permit under 30 TAC 116.111, General Application.

This registration includes planned MSS emissions authorized under the Non-Rule Oil & Gas Standard Permit.

SP (f)(4)

This rule states that prior to construction or implementation of changes for any project which meets this standard permit, a notification shall be submitted through the ePermits system (or hard copy). This notification shall include the following:

- (A) Identifying information (Core Data) and a general description of the project.
- (B) A fee of \$25 for small businesses as defined in 30 TAC §106.50 (Registration Fees for Permits by Rule), or \$50 for all others.

An initial notification meeting these requirements was submitted to the TCEQ via the ePermits system on February 8, 2013.

SP (f)(5)

This rule states that for any registration which meets the emission limitations of this standard permit must meet the following:

- (A) Within 90 days after start of operation or implemented changes (whichever occurs first), the facilities must be registered with a PI-1S Standard Permit Application.
- (B) Include a detailed summary of maximum emissions estimates based on representative gas and liquid analysis, equipment design specifications and operations, material type and throughput, other parameters for determining emissions, and documentation demonstrating compliance with applicable requirements.
- (C) Pay registration fee of \$475 for small businesses, or \$850 for all others.
- (D) Construction may begin any time after receipt of written notification to the executive director. Operations may continue after receipt of registration if there are no objections or 45 days after receipt by the executive director of the registration, whichever occurs first.

This SP registration is being submitted in accordance with these requirements.

SP (f)(6)

This rule states that if an OGS emissions increase, either through a change in production or addition of facilities, the site may change authorization (Level 1 or Level 2 PBR in 30 TAC §106.352 or Standard Permit) within 90 days from the initial notification of construction of an oil and gas facility or within 90 days of the change of production or installation of additional equipment, by submitting an initial registration or revision to the PBR or Standard Permit.

At the time of this registration, Burlington maintains that the Site should be permitted under the SP level, as reflected in the initial notification.

SP (f)(7)

This rule states that all registrations, registration revisions, and renewals shall be submitted to the commission through a PI-1S Standard Permit Registration Form. Fee requirements do not apply when there are changes in representations with no increase in emissions within 6-months after a standard permit registration has been issued.

A PI-1S Standard Permit Registration Form is part of this initial SP registration; therefore, the requirements of this rule will be met.

SP (g)

This rule states that any claim under this standard permit must comply with all applicable requirements of 30 TAC §116.610; §116.611, Registration to Use a Standard Permit; §116.614, Standard Permit Fees; and §116.615, General Conditions. This standard permit supersedes: the notification requirements of 30 TAC §116.615, General Conditions; and the emission limitations of 30 TAC §116.610(a)(1), Applicability.

This SP registration complies with all applicable requirements as listed in this rule and discussed later in this section; therefore, the requirements of this rule will be met.

SP (h)

Total maximum estimated registered or certified emissions shall meet the most stringent of the following:

(1) The applicable limits for a major stationary source or major modification for PSD and NNSR as specified in 30 TAC §116.12.

(2) Paragraph (k) of this standard permit.

(3) The limits set forth by Paragraph (h)(3).

The Site complies with this rule. Refer to Attachment 5 for the Impacts Evaluation.

SP (i)(1)

This rule states that prior to January 5, 2012, representations and registration of planned MSS is voluntary, but if represented must meet the applicable limits of the standard permit. After January 5, 2012, all emissions from planned MSS activities and facilities must be considered for compliance with applicable limits of the standard permit unless otherwise stated in (b)(7). This section may not be used at a site or for facilities authorized under §116.111 of this title if planned MSS has already been authorized under that permit.

The Site has not been previously authorized under §116.111. Burlington has voluntarily included MSS activities in this SP registration submittal as opposed to the delayed compliance date. Therefore, the requirements of this rule will be met.

SP (i)(2)

This rule states that releases of air contaminants during, or as result of, planned MSS must be quantified and meet the emission limits in this standard permit, as applicable. This analysis must include:

- (A) alternate operational scenarios or redirection of vent streams;
- (B) pigging, purging, and blowdowns;
- (C) temporary facilities if used for degassing or purging of tanks, vessels, or other facilities;
- (D) degassing or purging of tanks, vessels, or other facilities; and
- (E) management of sludge from pits, ponds, sumps, and water conveyances.

This submittal includes emissions representations for alternate operational scenarios during maintenance events. The first scenario occurs when the VRU is down for maintenance and the flare is used as a back-up to control the emissions. Emissions related to the use of the flare to control emissions from the tanks are represented in this application as an SMSS event.

The second scenario occurs when the engines located at the site goes down for maintenance. Engine downtime would result in gas released from the compressors and in turn from the engines starter vent. All gas from the blowdowns is sent to the flare. The proposed site emissions include this maintenance event and the resulting combustion emissions.

The proposed site emissions include this maintenance event and the resulting combustion emissions. All other MSS activities listed in this rule do not apply to the Site.

SP (i)(3)

This rule states that other planned MSS activities authorized by this standard permit are limited to the following. These planned MSS activities require only recordkeeping of the activity.

- (A) Routine engine component maintenance including filter changes, oxygen sensor replacements, compression checks, overhauls, lubricant changes, spark plug changes, and emission control system maintenance.
- (B) Boiler refractory replacements and cleanings.
- (C) Heater and heat exchanger cleanings.
- (D) Turbine hot standard permit swaps.
- (E) Pressure relief valve testing, calibration of analytical equipment; instrumentation/analyzer maintenance; replacement of analyzer filters and screens.

Burlington will maintain records for the planned MSS activities listed in this SP registration; therefore, the requirements of this rule are met.

SP (i)(4)

This rule states that engine and compressor startups associated with preventative system shutdown activities have the option to be authorized as part of typical operations if:

- (A) prior to operation, alternative operating scenarios to divert gas or liquid streams are registered and certified with all supporting documentation;
- (B) engine/compressor shutdowns shall result in no greater than 4 lb/hr of natural gas emissions; and

(C) emissions which result from the subsequent compressor startup activities are controlled to a minimum of 98% efficiency for VOC and H₂S.

Burlington will comply with this section.

SP (j)

This rule states requirements for sampling, monitoring, and records. The following records shall be maintained at the facility site (or an office within Texas having day-to-day operational control of the plant site) in written or electronic form and be readily available to the agency or local air pollution control program with jurisdiction upon request.

(1) Sampling and demonstrations of compliance shall include the requirements listed in Paragraph (m) Table 7.

(2) Monitoring and records for demonstrations of compliance shall include the requirements listed in Paragraph (m) Table 8.

Burlington will perform the sampling and monitoring activities and maintain the appropriate records as required in Paragraph (m) Tables 7 and 8; therefore, the requirements of this rule will be met.

SP (k)(1)-(2)

This rule states all impacts evaluations must be completed on a contaminant-by-contaminant basis for any net emissions increases resulting from a project and must meet the following as appropriate:

(A) Compliance with state or federal ambient air standards for nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and H₂S shall be demonstrated using the shortest distance from any emission point, vent, or fugitive component to the nearest property-line within 1 mile of a project.

(B) Compliance with hourly and annual ESLs for benzene shall be demonstrated using the shortest distance from any emission point, vent, or fugitive component to the nearest receptor within 1 mile of a project.

Impacts analyses were conducted in accordance with this rule. Please refer to attachment 5 for the impacts evaluation.

SP (k)(3)

This rule states that impacts evaluations are not required under the following cases:

(A) If there is no receptor within 1 mile of a registration, no further ESL review is required.

(B) If there is no property line within 1 mile of a registration, no further ambient air quality standard review is required.

(C) If the project total emissions are less than 0.039 lb/hr benzene, 0.025 lb/hr H₂S, 2 lb/hr SO₂, or 4 lb/hr NO₂, no additional analysis or demonstration of the specified air contaminant is required.

Hourly total emissions for NO_x, Benzene, and H₂S exceed the limits in subsection (C). Therefore, impact evaluations are required for each of these contaminants and are included in Attachment 5.

SP (k)(4)

This rule states that emission evaluations shall meet the following:

(A) For all evaluations of NO_x to NO₂, a conversion factor of 0.20 for 4-stroke rich and lean-burn engines and 0.50 for 2-stroke lean-burn engines may be used.

(B) The maximum predicted concentration or rate at the property boundary or receptor, whichever is appropriate, must not exceed a state or federal ambient air standard or ESL.

Emission evaluations were conducted in accordance with this rule. As shown in Attachment 5, the maximum predicted concentrations at the property boundary or receptor were below the state or federal ambient air standard.

SP (k)(5)(A)

This rule states that the following shall be met for ESL reviews:

- (i) If a project's air contaminant maximum predicted concentrations are equal to or less than 10% of the appropriate ESL, no further review is required.
- (ii) If a project's air contaminant maximum predicted concentrations combined with project increases for that contaminant over a 60-month period after the effective date of this revised section are equal to or less than 25% of the appropriate ESL, no further review is required.
- (iii) In all other cases, all facility emissions at an OGS, regardless of authorization type, located within 1 mile of a project requiring registration under this section shall be evaluated.

Burlington has evaluated all Site emissions for impacts analysis purposes. Refer to Attachment 5 for modeling results.

SP (k)(5)(B)

This rule states that the following shall be met for state and federal ambient air quality standard reviews:

- (i) If a project's air contaminant maximum predicted concentrations are equal to or less than the significant impact level (also known as de minimis impact in Chapter 101 of this title (relating to General Air Quality Rules)), no further review is required;
- (ii) In all other cases, all facility emissions at an OGS, regardless of authorization type, located within 1 mile of a project requiring registration under this section shall be evaluated.

Please refer to Attachment 5.

SP (k)(6)

This rule states that evaluation must comply with one of the methods listed with no changes or exceptions.

(A) Emission impact Tables 2 - 5F in Paragraph (m) may be used in accordance with the limits and descriptions in Paragraph (m) Table 1.

(B) A screening model may be used to demonstrate acceptable emissions from an OGS under this section if all of the parameters in the screening modeling protocol provided by the commission are met.

(C) A refined dispersion model may be used to demonstrate acceptable emissions from an OGS if all of the parameters in the refined dispersion modeling protocol provided by the commission are met.

Screen modeling was used to satisfy the requirements of this rule for the NO_x emissions impacts analysis. The TCEQ provided impact Tables were utilized for Benzene and H₂S. These results are provided in Attachment 5.

SP (l)

This paragraph states that 30 TAC §116.620 is applicable for existing unchanged facilities and new or changing facilities as specified in paragraph (a)(1) of this standard permit.

Burlington has voluntarily elected to comply with paragraphs (a) through (k) of this Non-Rule SP. Therefore, paragraph (l) of this rule is not applicable.

30 TAC §116.610. Applicability, effective February 1, 2006

30 TAC §116.610(a)(1)

This paragraph of the TCEQ standard permit applicability rules requires that any project with a net increase in any air contaminant other than carbon dioxide, water, nitrogen, methane, ethane, hydrogen, oxygen, or those for which a National Ambient Air Quality Standard (NAAQS) has been established must meet the emission limitations of 30 TAC §106.261(2) or (3) or §106.262(2), unless otherwise specified by a particular standard permit.

The Site is electing to comply with the requirements of the Non-Rule Air Quality Standard Permit for Oil and Gas Handling and Production Facilities effective February 27, 2011, which supersedes the emission limitations of this rule. Therefore, this rule does not apply.

30 TAC §116.610(a)(2)

This rule states that a project authorized by standard permit must meet the conditions of the standard permit in effect at the time construction or operation is commenced.

The Site will meet the requirements of the Non-Rule Air Quality SP for Oil and Gas Handling and Production Applicability effective February 27, 2011. Should another SP come into effect prior to TCEQ concurrence with this SP authorization, Burlington will comply with the requirements of that version of the SP.

30 TAC §116.610(a)(3)

This rule requires that the project comply with applicable provisions of the Federal Clean Air Act (FCAA), §111 (concerning New Source Performance Standards (NSPS), as listed under 40 Code of Federal Regulations (CFR) Part 60.

The applicability of this rule is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC §116.610(a)(4)

This rule requires that the proposed project comply with the applicable provisions of the FCAA, §112 concerning Hazardous Air Pollutants (HAPs), as listed under 40 CFR Part 61.

The applicability of this rule is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC §116.610(a)(5)

This rule states that the project must comply with applicable maximum achievable control technology (MACT) standards listed under 40 CFR Part 63 or 30 TAC Chapter 113, Subchapter C relating to National Emissions Standards for Hazardous Air Pollutants.

The applicability of this rule is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC §116.610(a)(6)

This rule applies to facilities that are subject to the Mass Emissions Cap and Trade requirements listed in 30 TAC Chapter 101, Subchapter H, Division 3.

These requirements do not apply to the Site, which is located in Live Oak County, Texas.

30 TAC §116.610(b)

This rule states that any project, except those authorized under 30 TAC §116.617 of this title (relating to Standard Permits for Pollution Control Permits), which constitute a new major source or major modification under the new source review requirements of the FCAA, Part C or Part D is subject to the requirements of 30 TAC §116.110 rather than 30 TAC Chapter 116 Subchapter F.

The Site is not a major source of air pollutants, with respect to Prevention of Significant Deterioration (PSD) permitting regulations. The Site is located in Live Oak County, which is an attainment county; therefore, the Site is not required to be evaluated for nonattainment permitting requirements.

30 TAC §116.610(c)

This rule prohibits circumvention of the requirements of 30 TAC §116.110 by artificial limitations.

Burlington is not taking any artificial limitations on the Site's emissions. Therefore, the condition of this rule has been met.

30 TAC §116.610(d)

This rule states that any project involving a proposed affected facility (as defined in §116.15(1) of this title (relating to Section 112(g) Definitions)) shall comply with all applicable requirements under Subchapter C of this chapter (relating to Hazardous Air Pollutants: Regulations Governing Constructed and Reconstructed Major Sources (FCAA, §112(g), 40 CFR Part 63)).

The Site is not subject to FCAA §112(g), 40 CFR Part 63 requirements, referenced in 30 TAC Chapter 116 Subchapter C.

30 TAC §116.611. Registration to Use a Standard Permit, effective December 11, 2002

This rule states that, if required, registration to use a standard permit shall be sent by certified mail, return receipt requested, or hand delivered to the executive director, the appropriate commission regional office, and any local air pollution program with jurisdiction, before a standard permit can be issued. The registration, at a minimum, must include the basis of the air emission estimates, quantification of all emission increases and decreases associated with the project, sufficient information to demonstrate the project's compliance with §116.610(b), information describing efforts to minimize emissions increases that will result from the project, a description of the project and related processes, and a description of any equipment installed. A certified registration must be submitted to avoid applicability of Chapter 122 and be maintained in accordance with §116.115.

A certified registration for this Site is being submitted to the appropriate state and local entities using the required forms and including all appropriate demonstrations of compliance with the requirements of this rule.

30 TAC §116.614. Standard Permit Fees, effective October 20, 2002

This rule states that any person who registers to use a standard permit or an amended standard permit, or to renew a registration to use a standard permit shall remit at the time of registration, a flat fee of \$900 for each standard permit being registered. All standard permit fees will be remitted in the form of a check, certified check, electronic funds transfer, or money order made payable to the TCEQ and delivered with the permit registration.

A fee of \$850.00 for this SP is being remitted to the TCEQ with the SP registration. A fee of \$50.00 was submitted with the initial notification on February 8, 2013.

30 TAC §116.615. General Conditions, effective March 15, 2007

30 TAC §116.615(1)

This condition states that emissions from the facility must comply with all applicable rules and regulations adopted under Texas Health and Safety Code, Chapter 382, and with the intent of the Texas Clean Air Act (TCAA), including protection of health and property of the public.

The Site emissions will comply with all TCEQ rules and regulations as well as with the intent of the TCAA, including protection of the health and property of the people near the Site.

30 TAC §116.615(2)

This condition states that all representations with regard to construction plans, operating procedures, and maximum emission rates in any registration package become conditions upon which the facility, or changes thereto, must be constructed and operated.

The Site will be operated as represented in this SP. If any representation changes occur, Burlington will verify that the emission sources remain eligible for a SP and notify the executive director of any changes no later than 30 days after the change, in accordance with this condition.

30 TAC §116.615(3)

This condition states that all changes authorized under standard permit to a facility previously authorized under 30 TAC §116.110 shall be incorporated into that permit at such time as the permit is amended or renewed.

The Site was not previously authorized under 30 TAC §116.110; therefore, this condition does not apply.

30 TAC §116.615(4)

This condition states that start of construction, construction interruptions exceeding 45 days, and completion of construction shall be reported to the appropriate regional office not later than 15 working days after occurrence of the event, unless otherwise specified in the standard permit.

Burlington will comply with the reporting requirements listed in this condition.

30 TAC §116.615(5)

This condition lists requirements associated with start-up notification to the appropriate air program regional office and any other air pollution control program having jurisdiction.

This rule is not applicable for sites subject to the Non-Rule Air Quality SP for Oil and Gas Handling and Production Facilities Applicability sections (a)-(k).

30 TAC §116.615(6)

This condition contains requirements associated with stacks or process vents required to perform sampling operations.

Burlington will continue to conduct sampling required by this SP, as applicable. Should the TCEQ request stack sampling of other sources authorized by this SP, Burlington will comply with this section.

30 TAC §116.615(7)

This condition requires that the standard permit holder demonstrate or otherwise justify the equivalency of emission control methods, sampling or other emission testing methods, and monitoring methods proposed as alternatives to methods indicated in the conditions of the standard permit.

Burlington is not proposing alternative emission control methods, sampling or other emission testing methods, or monitoring methods at this time. Should Burlington elect to propose such alternatives, Burlington will do so in accordance with this condition.

30 TAC §116.615(8)

This condition contains the recordkeeping requirements associated with the standard permit.

Burlington will retain a copy of the SP along with information and data sufficient to demonstrate applicability of, and compliance with, the SP and will be made available at the request of representatives of the executive director, the EPA, or any air pollution control program having jurisdiction.

30 TAC §116.615(9)

This condition requires that facilities covered by the standard permit not be operated unless all air pollution emission capture and abatement equipment is maintained in good working order and operating properly during normal facility operations.

Equipment will not be operated unless the air emissions control equipment is operating properly during normal facility operations. Any emission events that are not included in this SP will be reported in accordance with 30 TAC §101.201 and §101.211.

30 TAC §116.615(10)

This condition states that registration of a standard permit by a standard permit applicant constitutes an acknowledgement and agreement that the holder will comply with all rules, regulations, and orders of the commission issued in conformity with the TCAA and the conditions precedent to the claiming of the standard permit.

Burlington will comply with all applicable rules, regulations, and orders of the commission.

30 TAC §116.615(11)

This condition states that if a standard permit for a facility requires a distance, setback, or buffer from other property or structures as a condition of the permit, the determination of whether the distance, setback, or buffer is satisfied shall be made on the basis of conditions existing at the earlier of:

- (A) the date new construction, expansion, or modification of a facility begins; or
- (B) the date any application or notice of intent is first filed with the commission to obtain approval for the construction or operation of the facility.

Burlington will comply with the distance determination requirements stated in this rule, as applicable.



**Air Quality Standard Permits (SP)
General Requirements Checklist
Title 30 Texas Administrative Code §§116.610-116.615**

Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the rule number. The SP forms, tables, checklists, and guidance documents are available from the TCEQ, Air Permits Division web site at: www.tceq.state.tx.us/permitting/air/nav/standard.html.

Most Standard Permits require registration with the commission's Office of Permitting, Remediation, and Registration in Austin. The facilities and/or changes to facilities can be registered by completing a **Form PI-1S**, "Registration for Air Standard Permit." This checklist should accompany the registration form to expedite any registration review.

CHECK THE MOST APPROPRIATE ANSWERS AND FILL IN THE REQUESTED INFORMATION			
Rule	Questions/Description	Information	Response
116.610 (a)(1)	Are there net emissions increases associated with this registration? <i>If "YES," will net emission increases of air contaminants from the project, other than those for which a National Ambient Air Quality Standard (NAAQS) has been established, meet the emission limits of § 106.261 or § 106.262?</i> <i>If "NO," does the specific standard permit exempt emissions from this limit?</i>	Attach emissions summary & calculations	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.610 (a)(3)	Do any of the Title 40 Code of Federal Regulations Part (CFR) 60, New Source Performance Standards apply to this registration? <i>If "YES," list subparts</i>	List subparts: NSPS JJJJ	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
116.610 (a)(4)	Do any Hazardous Air Pollutant requirements apply to this registration? <i>If "YES," list subparts</i>	List subparts:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
116.610 (a)(5)	Do any maximum achievable control technology (MACT) standards as listed under 40 CFR Part 63 or Chapter 113, Subchapter C (National Emissions Standard for Hazardous Air for Source Categories) apply to this registration? <i>If "YES," list subparts</i>	List subparts: MACT ZZZZ, MACT HH	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.610 (a)(6)	Will additional emission allowances under Chapter 101, Subchapter H, Division 3, Emissions Banking and Trading, need to be obtained following this registration?		<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO



**Air Quality Standard Permits (SP)
General Requirements Checklist
Title 30 Texas Administrative Code §§116.610-116.615**

CHECK THE MOST APPROPRIATE ANSWERS AND FILL IN THE REQUESTED INFORMATION			
Rule	Questions/Description	Information	Response
116.611 (a) (1-6)	Is the following documentation included with this registration: Emissions calculations including the basis of the calculations? Quantification of all emission increases and/or decreases associated with this project? Sufficient information demonstrating that this project does not trigger PSD or NNSR review? Description of efforts to minimize collateral emissions increases associated with this project? Process descriptions including related processes? Description of any equipment being installed?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.614	Are the required fee and a copy of the check or money order provided with the application?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.615 (1)	Will emissions from the facility comply with all applicable rules and regulations of the commission adopted under Texas Health and Safety Code, Chapter 382, and with the intent of the Texas Clean Air Act?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.615 (2)	Do you understand that all representations with regard to construction plans, operating procedures, and maximum emission rates in this registration become conditions upon which the facility will be constructed and operated?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.615 (3)	Do you understand that all changes authorized by this registration need to be incorporated into the facility's permit if the facility is currently permitted under §116.110 (relating to Applicability)?	List all related permit numbers: 94696	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.615 (9) 617 (e)(1)	Will all air pollution emission capture and abatement equipment be maintained in good working order?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
116.615 (10)	Will the facility comply with all applicable rules and regulations of the TCEQ, the Texas Health and Safety Code, Chapter 382, and the Texas Clean Air Act?		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

**ATTACHMENT 5
IMPACTS EVALUATION**

OIL AND GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB – BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

SUMMARY OF NO_x SCREEN3 MODELING RESULTS
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTD - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

FIN	EPN	Description	PTE _(NO_x,HR) ^a (lb/hr)	C _(NO_x,HR) ^b (µg/m ³)	GLC _(NO_x,HR) ^c (µg/m ³)	R _(NO_x,lb NO_x) ^d (lb NO _x /lb NO _x)	GLC _(NO_x,HR) ^e (µg/m ³)	Annual Conversion Factor (CF)	GLC _(NO_x,YR) ^f (µg/m ³)
Normal Operations									
COMP-01	COMP-01	Compressor Engine 1	2.95	12.46	36.76	0.20	7.35	0.08	0.59
COMP-02	COMP-02	Compressor Engine 2	2.78	14.50	40.31	0.20	8.06	0.08	0.64
REB-1	REB-1	Glycol Reboiler No. 1	0.05	441.90	22.10	0.75	16.57	0.08	1.33
FL-1	FL-1	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-1	FL-1	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-2	FL-2	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-2	FL-2	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-3	FL-3	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-3	FL-3	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-3	FL-3	Flare Combustion (normal operations waste gas condensate)	0.58	5.70	3.31	0.75	2.48	0.08	0.20
FL-3	FL-3	Flare Combustion (normal operations waste gas Produced water)	0.01	103.80	1.04	0.75	0.78	0.08	0.06
Maintenance, Startup, and Shutdown									
FL-1-SMSS	FL-1-SMSS	Flare Combustion (engines blowdown waste gas)	0.24	11.72	2.81	0.75	2.11	0.08	0.17
FL-2-SMSS	FL-2-SMSS	Condensate and Slop Waste Gas Combustion (during VRU downtime)	0.78	4.47	3.49	0.75	2.62	0.08	0.21
FL-2-SMSS	FL-2-SMSS	Produced Water Waste Gas Combustion (during VRU downtime)	0.02	72.64	1.45	0.75	1.09	0.08	0.09
			Total Engine NO_x Concentration (µg/m³):			46.26			
			Live Oak County NO₂ Background Concentration (µg/m³):			70.00			
			Total Off-Property Concentration (µg/m³):			118.26			
			NO₂ NAAQS (µg/m³):			188			

^a PTE_(NO_x,HR) = Hourly PTE NO_x.

^b C_(NO_x,HR) = Hourly NO_x concentration predicted by SCREEN3 model, using a nominal 1 lb/hr NO_x emission rate.

^c GLC_(NO_x,HR) = Hourly ground level concentration of NO_x.

An example calculation for hourly NO_x ground level concentration for FIN FL-1 (normal operations pilot) follows:

$$GLC_{(NO_x,HR)} = PTE_{(NO_x,HR)} \cdot C_{(NO_x,HR)}$$

$$GLC_{(NO_x,HR)} = 0.003 \text{ lb/hr} \cdot 152.3 \text{ µg/m}^3 / 1 \text{ lb/hr}$$

$$GLC_{(NO_x,HR)} = 0.46 \text{ µg/m}^3 \text{ NO}_x$$

^d R_(NO_x,NO₂) = NO₂/NO_x ratio from TCEQ guidance and section (k) of the Non-Rule Standard Permit (attached).

^e GLC_(NO₂,HR) = Hourly ground level concentration of NO₂.

An example calculation for hourly NO₂ ground level concentration for FIN FL-1 follows:

$$GLC_{(NO_2,HR)} = GLC_{(NO_x,HR)} \cdot R_{(NO_2,NO_x)}$$

$$GLC_{(NO_2,HR)} = 0.46 \text{ µg/m}^3 \cdot 0.75 \text{ lb NO}_2/\text{lb NO}_x$$

$$GLC_{(NO_2,HR)} = 0.34 \text{ µg/m}^3 \text{ NO}_2$$

^f GLC_(NO₂,YR) = Annual ground level concentration of NO₂.

An example calculation for annual NO₂ ground level concentration for FIN FL-1 follows:

$$GLC_{(NO_2,YR)} = GLC_{(NO_2,HR)} \cdot CF$$

$$GLC_{(NO_2,YR)} = 0.34 \text{ µg/m}^3 \cdot 0.08$$

$$GLC_{(NO_2,YR)} = 0.03 \text{ µg/m}^3 \text{ NO}_2$$

^g The hourly and annual NO₂ background concentration is based on TCEQ Guidance.

Maximum concentrations are shown for each stream sent to the Flare. Note that, the maximum distance is not the same for each stream, but representing all at the maximum concentration is the most conservative approach. Additionally, not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the emissions shown are conservatively represented.

BENZENE EMISSION IMPACT ANALYSIS
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Hourly ESL ($\mu\text{g}/\text{m}^3$): 170
 Annual ESL ($\mu\text{g}/\text{m}^3$): 4.5

EPN	FIN	Benzene Emissions		Stack Parameters		G (µg/m³/hb/hr)	WR		Calculated Health Effects Review		
		(lb/hr)	(tpy)	Distance (ft)	Height (ft)		(hourly)	(annual)	(lb/hr)	(tpy)	
Normal Operations											
COMP-01	COMP-01	0.01	0.04	1450	20	14	3.88%	11.27%	0.47	1.98	
COMP-02	COMP-02	0.006	0.03	1480	20	14	2.33%	8.46%	0.28	1.49	
FUG	FUG	0.02	0.09	1043	3	293	7.76%	25.37%	0.05	0.21	
REB-1	REB-1	0.000001	0.000004	1830	14	76	0.0004%	0.001%	0.00001	0.00004	
REB-1	DEHY-SV	0.04	0.17	1830	14	76	15.52%	47.91%	0.35	1.55	
FL-3	TK-20	0.005	0.01	1752	30	31	1.94%	2.82%	0.11	0.22	
FL-3	TK-21	0.0002	0.001	1752	30	31	0.08%	0.28%	0.004	0.02	
VRU	TRUCK1	0.003	0.002	1270	10	264	1.16%	0.56%	0.01	0.01	
VRU	TRUCK2	0.0001	0.00001	1270	10	264	0.04%	0.003%	0.0002	0.00003	
FL-3	TRUCK3	0.01	0.003	1750	30	31	3.88%	0.85%	0.021	0.00022	
FL-3	TRUCK4	0.0001	0.00001	1750	30	31	0.04%	0.003%	0.0001	0.0002	
FL-1	FL-1	0.000003	0.00001	1420	30	36	0.001%	0.003%	0.0001	0.0002	
FL-2	FL-2	0.000003	0.00001	1450	30	36	0.001%	0.003%	0.0001	0.0002	
FL-3	FL-3	0.000003	0.00001	1750	30	31	0.001%	0.003%	0.0001	0.0002	
Maintenance, Startup, and Shutdown											
COMP-01-SV	COMP-01-SV	0.07	0.002	1450	20	16	27.16%	0.56%	2.89	0.09	
FL-1-SMSS	COMP-01-BD	0.001	0.00002	1420	30	36	0.39%	0.01%	0.02	0.0004	
COMP-02-SV	COMP-02-SV	0.07	0.002	1480	20	16	27.16%	0.56%	2.89	0.09	
FL-1-SMSS	COMP-02-BD	0.001	0.00002	1450	30	36	0.39%	0.01%	0.02	0.0004	
TK-01	TK-01	0.01	0.004	1450	30	36	3.88%	1.13%	0.18	0.08	
FL-2-SMSS	through TK-08	0.001	0.0002	1450	30	36	0.39%	0.056%	0.02	0.004	
FL-2-SMSS	TK-09	0.001	0.0002	1450	30	36	0.39%	0.056%	0.02	0.004	
FL-2-SMSS	TK-10	0.0002	0.0001	1450	30	36	0.08%	0.03%	0.004	0.002	
FL-2-SMSS	through TK-19	0.01	0.0004	1450	30	36	3.88%	0.11%	0.18	0.01	
FL-2-SMSS	TRUCK1	0.0001	0.00002	1450	30	36	0.04%	0.001%	0.002	0.00004	
FL-2-SMSS	TRUCK2	0.0001	0.00002	1450	30	36	0.04%	0.001%	0.002	0.00004	
Total		0.26	0.35						7.68	5.87	

Impacts Analysis:

Calculated Benzene Emissions (lb/hr): 0.26 Hourly
 Calculated Benzene Health Effects Review (lb/hr): 7.68 Annual

Per the non-Rule Oil and Gas Standard Permit (b)(4)(B), the site's air contaminant maximum predicted concentrations are less than the appropriate ESL. Therefore the impacts analysis meets the requirements of the Oil and Gas Standard Permit.

Health Effects Calculators and Impact factors G and WR, and equations from Air Quality Standard Permit for Oil and Gas Handling and Production Facilities (k) and Tables

Table 1: Emission Impact Tables Limits and Descriptions

Table 2: Fugitives and Process Vents Table

Table 3: Flares and Thermal Destruction Devices

Short-Term ESL 170 $\mu\text{g}/\text{m}^3$ and Long-Term ESL 4.5 $\mu\text{g}/\text{m}^3$ per TCEQ Development Support Document Benzene CAS # 71-43-2, dated October 15, 2007

NOTE: Not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the analysis shown is conservatively represented.

H₂S EMISSION IMPACT ANALYSIS
OIL AND GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

State Property Line Standard (µg/m³): 108

EPN	FIN	Description	H ₂ S Emissions		Stack Parameters		G (µg/m ³ /lb/hr)	WR (hourly)	Calculated Health Effects	
			(lb/hr)		Distance (ft)	Height (ft)			Review (lb/hr)	
Normal Operations										
FUG	FUG	Site Fugitives	0.001		50	3	4375	1.89%		0.0005
REB-1	DEHY-SV	Glycol Dehy Still Vent	0.01		50	14	469	18.89%		0.04
FL-3	TK-20	Condensate Storage Tank at Baker	0.0002		50	30	43	0.38%		0.01
FL-3	TK-21	Produced Water Storage Tank at Baker	0.00001		50	30	43	0.02%		0.0005
FL-1	FL-1	Flare Combustion (normal operations assist, and pilot)	0.00001		50	30	43	0.02%		0.0005
FL-2	FL-2	Flare Combustion (normal operations assist, and pilot)	0.00001		50	30	43	0.02%		0.0005
FL-3	FL-3	Flare Combustion (normal operations waste gas, assist, and pilot)	0.0001		50	30	43	0.19%		0.005
Maintenance, Startup, and Shutdown										
COMP-01-SV	COMP-01-SV	Compressor Engine 1 Starter Vent	0.02		50	20	25	37.77%		1.63
FL-1-SMSS	COMP-01-BD	Compressor Engine 1 Blowdown	0.0002		50	30	43	0.38%		0.01
COMP-02-SV	COMP-02-SV	Compressor Engine 2 Starter Vent	0.02		50	20	25	37.77%		1.63
FL-1-SMSS	COMP-02-BD	Compressor Engine 2 Blowdown	0.0002		50	30	43	0.38%		0.01
FL-2-SMSS	TK-01 through TK-08	Controlled Condensate Tanks Emissions (during VRU downtime)	0.0004		50	30	43	0.76%		0.02
FL-2-SMSS	TK-10 through TK-19	Controlled Produced Water Tank Emissions (during VRU downtime)	0.00002		50	30	43	0.038%		0.001
FL-1-SMSS	FL-1-SMSS	Flare 1 Combustion (Engine blowdown waste gas)	0.0004		50	30	43	0.76%		0.02
FL-2-SMSS	FL-2-SMSS	Flare 2 Combustion (Tanks waste gas during VRU downtime)	0.0004		50	30	43	0.76%		0.02
Total			0.05		1.40					

Per the non-Rule Oil and Gas Standard Permit (k)(4)(B), the site's air contaminant maximum predicted concentrations are less than the appropriate ESL. Therefore the impacts analysis meets the requirements of the Oil and Gas Standard Permit.

Health Effects Calculations and Impact factors G and WR, and equations from Air Quality Standard Permit for Oil and Gas Handling and Production Facilities (k) and Tables

Table 1: Emission Impact Tables Limits and Descriptions

Table 2: Fugitives and Process Vents Table

Table 3: Flares and Thermal Destruction Devices

State Property Line Standard 108 µg/m³ per 30 TAC Ch 112 and TCEQ Modeling Guidance

NOTE: Not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the analysis shown is conservatively represented.

SCREEN.OUT

02/07/13
12:26:20*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - COMP-01

SIMPLE TERRAIN INPUTS:

```

SOURCE TYPE           =          POINT
EMISSION RATE (G/S)   =          .125800
STACK HEIGHT (M)      =          6.0960
STK INSIDE DIAM (M)   =          .3048
STK EXIT VELOCITY (M/S) =          26.4285
STK GAS EXIT TEMP (K) =          802.5940
AMBIENT AIR TEMP (K)  =          293.0000
RECEPTOR HEIGHT (M) =          .0000
URBAN/RURAL OPTION    =          RURAL
BUILDING HEIGHT (M)   =          .0000
MIN HORIZ BLDG DIM (M) =          .0000
MAX HORIZ BLDG DIM (M) =          .0000

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THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 4086.0000 (ACFM)

BUOY. FLUX = 3.822 M**4/S**3; MOM. FLUX = 5.922 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	64.66	1.50	1.45	NO
100.	12.18	3	10.0	10.0	3200.0	11.95	12.56	7.60	NO
200.	11.40	4	10.0	10.0	3200.0	11.95	15.65	8.66	NO
300.	10.20	4	5.0	5.0	1600.0	17.81	22.86	12.55	NO
400.	9.106	4	4.5	4.5	1440.0	19.11	29.69	15.72	NO
500.	8.007	4	3.5	3.5	1120.0	22.83	36.46	18.91	NO
600.	7.142	4	3.0	3.0	960.0	25.62	43.08	21.93	NO
700.	6.422	4	2.5	2.5	800.0	29.52	49.64	24.95	NO
800.	5.852	4	2.5	2.5	800.0	29.52	55.97	27.61	NO
900.	5.372	4	2.0	2.0	640.0	35.38	62.45	30.63	NO
1000.	4.979	4	2.0	2.0	640.0	35.38	68.64	33.17	NO
1100.	4.590	4	2.0	2.0	640.0	35.38	74.78	35.14	NO
1200.	4.262	4	1.5	1.5	480.0	45.14	81.21	37.78	NO
1300.	4.036	4	1.5	1.5	480.0	45.14	87.23	39.60	NO
1400.	4.040	5	1.0	1.0	10000.0	52.57	70.48	29.86	NO
1500.	4.078	5	1.0	1.0	10000.0	52.57	74.88	30.93	NO
1600.	4.224	6	1.0	1.0	10000.0	44.66	53.15	21.77	NO
1700.	4.379	6	1.0	1.0	10000.0	44.66	56.03	22.41	NO
1800.	4.508	6	1.0	1.0	10000.0	44.66	58.91	23.04	NO
1900.	4.614	6	1.0	1.0	10000.0	44.66	61.77	23.66	NO
2000.	4.698	6	1.0	1.0	10000.0	44.66	64.62	24.27	NO
2100.	4.727	6	1.0	1.0	10000.0	44.66	67.46	24.79	NO
2200.	4.744	6	1.0	1.0	10000.0	44.66	70.29	25.31	NO

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SCREEN.OUT									
2300.	4.749	6	1.0	1.0	10000.0	44.66	73.11	25.81	NO
2400.	4.745	6	1.0	1.0	10000.0	44.66	75.92	26.31	NO
2500.	4.733	6	1.0	1.0	10000.0	44.66	78.72	26.79	NO
2600.	4.715	6	1.0	1.0	10000.0	44.66	81.51	27.28	NO
2700.	4.690	6	1.0	1.0	10000.0	44.66	84.29	27.75	NO
2800.	4.659	6	1.0	1.0	10000.0	44.66	87.06	28.22	NO
2900.	4.625	6	1.0	1.0	10000.0	44.66	89.83	28.68	NO
3000.	4.587	6	1.0	1.0	10000.0	44.66	92.58	29.14	NO
3500.	4.309	6	1.0	1.0	10000.0	44.66	106.22	31.00	NO
4000.	4.032	6	1.0	1.0	10000.0	44.66	119.68	32.75	NO
4500.	3.768	6	1.0	1.0	10000.0	44.66	132.96	34.39	NO
5000.	3.524	6	1.0	1.0	10000.0	44.66	146.09	35.94	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:									
112.	12.46	3	10.0	10.0	3200.0	11.95	14.05	8.49	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	12.46	112.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN.OUT

02/07/13
12:30:32*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - COMP-02

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
 EMISSION RATE (G/S) = .125800
 STACK HEIGHT (M) = 6.0960
 STK INSIDE DIAM (M) = .3048
 STK EXIT VELOCITY (M/S) = 22.5412
 STK GAS EXIT TEMP (K) = 730.9280
 AMBIENT AIR TEMP (K) = 293.0000
 RECEPTOR HEIGHT (M) = .0000
 URBAN/RURAL OPTION = RURAL
 BUILDING HEIGHT (M) = .0000
 MIN HORIZ BLDG DIM (M) = .0000
 MAX HORIZ BLDG DIM (M) = .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
 VOLUME FLOW RATE = 3485.0000 (ACFM)

BUOY. FLUX = 3.076 M**4/S**3; MOM. FLUX = 4.731 M**4/S**2.

*** FULL METEOROLOGY ***

 *** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	55.86	1.39	1.34	NO
100.	14.48	3	10.0	10.0	3200.0	11.07	12.54	7.58	NO
200.	13.46	4	8.0	8.0	2560.0	12.32	15.66	8.68	NO
300.	12.28	4	5.0	5.0	1600.0	16.05	22.79	12.42	NO
400.	10.70	4	4.0	4.0	1280.0	18.54	29.67	15.68	NO
500.	9.428	4	3.0	3.0	960.0	22.68	36.46	18.90	NO
600.	8.397	4	2.5	2.5	800.0	26.00	43.09	21.96	NO
700.	7.525	4	2.5	2.5	800.0	26.00	49.52	24.70	NO
800.	6.904	4	2.0	2.0	640.0	30.98	56.03	27.71	NO
900.	6.290	4	2.0	2.0	640.0	30.98	62.29	30.31	NO
1000.	5.825	4	1.5	1.5	480.0	39.27	68.78	33.46	NO
1100.	5.441	4	1.5	1.5	480.0	39.27	74.91	35.42	NO
1200.	5.077	4	1.5	1.5	480.0	39.27	81.00	37.32	NO
1300.	4.737	4	1.5	1.5	480.0	39.27	87.04	39.17	NO
1400.	4.759	5	1.0	1.0	10000.0	49.32	70.31	29.46	NO
1500.	4.976	6	1.0	1.0	10000.0	41.97	50.09	20.74	NO
1600.	5.159	6	1.0	1.0	10000.0	41.97	52.99	21.40	NO
1700.	5.307	6	1.0	1.0	10000.0	41.97	55.89	22.04	NO
1800.	5.424	6	1.0	1.0	10000.0	41.97	58.77	22.68	NO
1900.	5.513	6	1.0	1.0	10000.0	41.97	61.64	23.31	NO
2000.	5.576	6	1.0	1.0	10000.0	41.97	64.49	23.93	NO
2100.	5.580	6	1.0	1.0	10000.0	41.97	67.34	24.46	NO
2200.	5.570	6	1.0	1.0	10000.0	41.97	70.18	24.98	NO

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				SCREEN.OUT					
2300.	5.550	6	1.0	1.0 10000.0	41.97	73.00	25.49	NO	
2400.	5.519	6	1.0	1.0 10000.0	41.97	75.81	25.99	NO	
2500.	5.481	6	1.0	1.0 10000.0	41.97	78.62	26.49	NO	
2600.	5.436	6	1.0	1.0 10000.0	41.97	81.41	26.97	NO	
2700.	5.386	6	1.0	1.0 10000.0	41.97	84.20	27.46	NO	
2800.	5.331	6	1.0	1.0 10000.0	41.97	86.97	27.93	NO	
2900.	5.273	6	1.0	1.0 10000.0	41.97	89.74	28.40	NO	
3000.	5.211	6	1.0	1.0 10000.0	41.97	92.49	28.86	NO	
3500.	4.833	6	1.0	1.0 10000.0	41.97	106.15	30.74	NO	
4000.	4.475	6	1.0	1.0 10000.0	41.97	119.61	32.49	NO	
4500.	4.146	6	1.0	1.0 10000.0	41.97	132.90	34.15	NO	
5000.	3.849	6	1.0	1.0 10000.0	41.97	146.03	35.71	NO	

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND				1. M:					
103.	14.50	3	10.0	10.0	3200.0	11.07	13.00	7.84	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	14.50		

SCREEN.OUT

02/07/13
12:32:40*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - REB-1

SIMPLE TERRAIN INPUTS:

```

SOURCE TYPE           = POINT
EMISSION RATE (G/S)   = .125800
STACK HEIGHT (M)      = 4.3586
STK INSIDE DIAM (M)   = .3175
STK EXIT VELOCITY (M/S) = .4465
STK GAS EXIT TEMP (K) = 672.0000
AMBIENT AIR TEMP (K)  = 293.0000
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION    = RURAL
BUILDING HEIGHT (M)   = .0000
MIN HORIZ BLDG DIM (M) = .0000
MAX HORIZ BLDG DIM (M) = .0000

```

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 74.910000 (ACFM)

BUOY. FLUX = .062 M**4/S**3; MOM. FLUX = .002 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	6.36	.45	.26	NO
100.	415.1	4	1.0	1.0	320.0	6.36	8.24	4.71	NO
200.	228.1	4	1.0	1.0	320.0	6.36	15.58	8.53	NO
300.	127.3	4	1.0	1.0	320.0	6.36	22.62	12.12	NO
400.	81.53	4	1.0	1.0	320.0	6.36	29.46	15.29	NO
500.	78.20	6	1.0	1.0	10000.0	13.46	18.18	8.85	NO
600.	76.01	6	1.0	1.0	10000.0	13.46	21.42	10.08	NO
700.	70.74	6	1.0	1.0	10000.0	13.46	24.62	11.28	NO
800.	64.38	6	1.0	1.0	10000.0	13.46	27.78	12.30	NO
900.	58.36	6	1.0	1.0	10000.0	13.46	30.90	13.28	NO
1000.	52.90	6	1.0	1.0	10000.0	13.46	34.00	14.23	NO
1100.	48.09	6	1.0	1.0	10000.0	13.46	37.07	15.08	NO
1200.	43.86	6	1.0	1.0	10000.0	13.46	40.11	15.90	NO
1300.	40.16	6	1.0	1.0	10000.0	13.46	43.13	16.71	NO
1400.	36.91	6	1.0	1.0	10000.0	13.46	46.13	17.49	NO
1500.	34.04	6	1.0	1.0	10000.0	13.46	49.11	18.25	NO
1600.	31.50	6	1.0	1.0	10000.0	13.46	52.07	18.99	NO
1700.	29.24	6	1.0	1.0	10000.0	13.46	55.01	19.71	NO
1800.	27.23	6	1.0	1.0	10000.0	13.46	57.93	20.43	NO
1900.	25.43	6	1.0	1.0	10000.0	13.46	60.84	21.12	NO
2000.	23.81	6	1.0	1.0	10000.0	13.46	63.74	21.81	NO
2100.	22.41	6	1.0	1.0	10000.0	13.46	66.62	22.39	NO
2200.	21.14	6	1.0	1.0	10000.0	13.46	69.48	22.95	NO

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SCREEN.OUT									
2300.	19.99	6	1.0	1.0	10000.0	13.46	72.33	23.51	NO
2400.	18.94	6	1.0	1.0	10000.0	13.46	75.17	24.05	NO
2500.	17.97	6	1.0	1.0	10000.0	13.46	78.00	24.58	NO
2600.	17.09	6	1.0	1.0	10000.0	13.46	80.81	25.11	NO
2700.	16.28	6	1.0	1.0	10000.0	13.46	83.62	25.62	NO
2800.	15.53	6	1.0	1.0	10000.0	13.46	86.41	26.13	NO
2900.	14.84	6	1.0	1.0	10000.0	13.46	89.19	26.63	NO
3000.	14.19	6	1.0	1.0	10000.0	13.46	91.97	27.12	NO
3500.	11.69	6	1.0	1.0	10000.0	13.46	105.69	29.11	NO
4000.	9.871	6	1.0	1.0	10000.0	13.46	119.20	30.96	NO
4500.	8.491	6	1.0	1.0	10000.0	13.46	132.53	32.69	NO
5000.	7.415	6	1.0	1.0	10000.0	13.46	145.70	34.32	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:									
56.	441.9	3	1.0	1.0	320.0	6.36	7.45	4.52	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	441.9		

SCREEN4- flare pilot.txt

06/28/12
15:24:54*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - Flare 1, 2 and 3 Pilot Gas

SIMPLE TERRAIN INPUTS:

```

SOURCE TYPE           =          FLARE
EMISSION RATE (G/S)   =          .125800
FLARE STACK HEIGHT (M) =          9.1440
TOT HEAT RLS (CAL/S)  =         1356.00
RECEPTOR HEIGHT (M) =          .0000
URBAN/RURAL OPTION    =          RURAL
EFF RELEASE HEIGHT (M) =          9.2873
BUILDING HEIGHT (M)   =          .0000
MIN HORIZ BLDG DIM (M) =          .0000
MAX HORIZ BLDG DIM (M) =          .0000

```

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .022 M**4/S**3; MOM. FLUX = .014 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	10.75	.45	.26	NO
100.	152.2	3	1.0	1.0	320.0	10.75	12.47	7.45	NO
200.	136.1	4	1.0	1.0	320.0	10.75	15.57	8.51	NO
300.	98.61	4	1.0	1.0	320.0	10.75	22.61	12.10	NO
400.	69.47	4	1.0	1.0	320.0	10.75	29.46	15.27	NO
500.	50.93	4	1.0	1.0	320.0	10.75	36.15	18.30	NO
600.	49.21	6	1.0	1.0	10000.0	16.25	21.33	9.89	NO
700.	50.41	6	1.0	1.0	10000.0	16.25	24.54	11.11	NO
800.	48.61	6	1.0	1.0	10000.0	16.25	27.71	12.14	NO
900.	45.99	6	1.0	1.0	10000.0	16.25	30.84	13.13	NO
1000.	43.07	6	1.0	1.0	10000.0	16.25	33.94	14.09	NO
1100.	40.09	6	1.0	1.0	10000.0	16.25	37.02	14.95	NO
1200.	37.28	6	1.0	1.0	10000.0	16.25	40.06	15.78	NO
1300.	34.68	6	1.0	1.0	10000.0	16.25	43.09	16.59	NO
1400.	32.29	6	1.0	1.0	10000.0	16.25	46.09	17.37	NO
1500.	30.12	6	1.0	1.0	10000.0	16.25	49.07	18.14	NO
1600.	28.14	6	1.0	1.0	10000.0	16.25	52.03	18.89	NO
1700.	26.35	6	1.0	1.0	10000.0	16.25	54.98	19.62	NO
1800.	24.72	6	1.0	1.0	10000.0	16.25	57.90	20.33	NO
1900.	23.23	6	1.0	1.0	10000.0	16.25	60.81	21.03	NO
2000.	21.88	6	1.0	1.0	10000.0	16.25	63.71	21.72	NO
2100.	20.68	6	1.0	1.0	10000.0	16.25	66.59	22.30	NO
2200.	19.59	6	1.0	1.0	10000.0	16.25	69.45	22.87	NO
2300.	18.59	6	1.0	1.0	10000.0	16.25	72.31	23.42	NO
2400.	17.67	6	1.0	1.0	10000.0	16.25	75.15	23.97	NO
2500.	16.82	6	1.0	1.0	10000.0	16.25	77.97	24.51	NO

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SCREEN4- flare pilot.txt									
2600.	16.04	6	1.0	1.0	10000.0	16.25	80.79	25.03	NO
2700.	15.32	6	1.0	1.0	10000.0	16.25	83.59	25.55	NO
2800.	14.65	6	1.0	1.0	10000.0	16.25	86.39	26.06	NO
2900.	14.02	6	1.0	1.0	10000.0	16.25	89.17	26.56	NO
3000.	13.44	6	1.0	1.0	10000.0	16.25	91.94	27.05	NO
3500.	11.16	6	1.0	1.0	10000.0	16.25	105.67	29.05	NO
4000.	9.469	6	1.0	1.0	10000.0	16.25	119.19	30.90	NO
4500.	8.180	6	1.0	1.0	10000.0	16.25	132.52	32.63	NO
5000.	7.169	6	1.0	1.0	10000.0	16.25	145.68	34.26	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:									
102.	152.3	3	1.0	1.0	320.0	10.75	12.81	7.66	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	152.3	102.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN5- flare assist.txt

06/29/12
14:43:07*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - Flare 1, 2 AND 3 Assist Gas

SIMPLE TERRAIN INPUTS:

```

SOURCE TYPE           =          FLARE
EMISSION RATE (G/S)   =          .125800
FLARE STACK HEIGHT (M) =          9.1440
TOT HEAT RLS (CAL/S)  =         113048.
RECEPTOR HEIGHT (M) =          .0000
URBAN/RURAL OPTION    =          RURAL
EFF RELEASE HEIGHT (M) =         10.3309
BUILDING HEIGHT (M)   =          .0000
MIN HORIZ BLDG DIM (M) =          .0000
MAX HORIZ BLDG DIM (M) =          .0000

```

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 1.874 M**4/S**3; MOM. FLUX = 1.143 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	44.57	.91	.83	NO
100.	10.86	1	3.0	3.0	960.0	21.75	27.05	14.32	NO
200.	12.48	3	3.5	3.5	1120.0	20.11	23.78	14.30	NO
300.	11.65	3	2.0	2.0	640.0	27.44	34.64	20.91	NO
400.	10.91	4	3.0	3.0	960.0	21.72	29.63	15.61	NO
500.	10.30	4	2.5	2.5	800.0	23.99	36.36	18.71	NO
600.	9.635	4	2.0	2.0	640.0	27.41	43.00	21.77	NO
700.	8.887	4	1.5	1.5	480.0	33.10	49.62	24.90	NO
800.	8.375	4	1.5	1.5	480.0	33.10	55.95	27.56	NO
900.	7.752	4	1.5	1.5	480.0	33.10	62.22	30.18	NO
1000.	7.164	4	1.0	1.0	320.0	44.48	68.82	33.54	NO
1100.	6.830	4	1.0	1.0	320.0	44.48	74.95	35.49	NO
1200.	6.481	4	1.0	1.0	320.0	44.48	81.03	37.39	NO
1300.	6.134	4	1.0	1.0	320.0	44.48	87.07	39.23	NO
1400.	5.798	4	1.0	1.0	320.0	44.48	93.06	41.04	NO
1500.	5.478	4	1.0	1.0	320.0	44.48	99.02	42.80	NO
1600.	5.267	6	1.0	1.0	10000.0	40.56	52.71	20.67	NO
1700.	5.445	6	1.0	1.0	10000.0	40.56	55.61	21.34	NO
1800.	5.585	6	1.0	1.0	10000.0	40.56	58.51	22.00	NO
1900.	5.691	6	1.0	1.0	10000.0	40.56	61.39	22.65	NO
2000.	5.767	6	1.0	1.0	10000.0	40.56	64.26	23.29	NO
2100.	5.778	6	1.0	1.0	10000.0	40.56	67.11	23.83	NO
2200.	5.772	6	1.0	1.0	10000.0	40.56	69.96	24.36	NO
2300.	5.753	6	1.0	1.0	10000.0	40.56	72.79	24.89	NO
2400.	5.723	6	1.0	1.0	10000.0	40.56	75.61	25.40	NO
2500.	5.683	6	1.0	1.0	10000.0	40.56	78.42	25.91	NO

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                                SCREEN5- flare assist.txt
2600.    5.636          6      1.0    1.0 10000.0  40.56    81.23    26.40    NO
2700.    5.583          6      1.0    1.0 10000.0  40.56    84.02    26.90    NO
2800.    5.524          6      1.0    1.0 10000.0  40.56    86.80    27.38    NO
2900.    5.461          6      1.0    1.0 10000.0  40.56    89.57    27.86    NO
3000.    5.395          6      1.0    1.0 10000.0  40.56    92.33    28.33    NO
3500.    4.991          6      1.0    1.0 10000.0  40.56   106.00    30.24    NO
4000.    4.609          6      1.0    1.0 10000.0  40.56   119.48    32.02    NO
4500.    4.260          6      1.0    1.0 10000.0  40.56   132.78    33.70    NO
5000.    3.945          6      1.0    1.0 10000.0  40.56   145.93    35.28    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND      1. M:
  200.    12.48          3      3.5    3.5 1120.0    20.11    23.78    14.30    NO

```

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	12.48	200.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN.OUT

02/07/13
12:36:38*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - FLARE baker COND

SIMPLE TERRAIN INPUTS:

```

SOURCE TYPE           =          FLARE
EMISSION RATE (G/S)   =          .125800
FLARE STACK HEIGHT (M) =          9.1440
TOT HEAT RLS (CAL/S)  =          291900.
RECEPTOR HEIGHT (M) =          .0000
URBAN/RURAL OPTION    =          RURAL
EFF RELEASE HEIGHT (M) =          11.0119
BUILDING HEIGHT (M)   =          .0000
MIN HORIZ BLDG DIM (M) =          .0000
MAX HORIZ BLDG DIM (M) =          .0000

```

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 4.840 M**4/S**3; MOM. FLUX = 2.951 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	80.45	1.19	1.13	NO
100.	2.971	2	5.0	5.0	1600.0	24.90	19.55	11.11	NO
200.	5.650	3	8.0	8.1	2560.0	19.67	23.75	14.25	NO
300.	5.477	3	4.5	4.5	1440.0	26.40	34.57	20.80	NO
400.	4.915	3	3.0	3.0	960.0	34.09	45.13	27.26	NO
500.	4.824	4	5.0	5.1	1600.0	24.79	36.36	18.72	NO
600.	4.545	4	4.0	4.1	1280.0	28.24	43.00	21.77	NO
700.	4.258	4	3.5	3.6	1120.0	30.70	49.51	24.68	NO
800.	3.990	4	3.0	3.0	960.0	33.98	55.96	27.57	NO
900.	3.729	4	2.5	2.5	800.0	38.57	62.38	30.50	NO
1000.	3.525	4	2.5	2.5	800.0	38.57	68.58	33.05	NO
1100.	3.289	4	2.5	2.5	800.0	38.57	74.73	35.02	NO
1200.	3.110	4	2.0	2.0	640.0	45.47	81.04	37.41	NO
1300.	2.952	4	2.0	2.0	640.0	45.47	87.08	39.26	NO
1400.	2.797	4	2.0	2.0	640.0	45.47	93.07	41.06	NO
1500.	2.648	4	2.0	2.0	640.0	45.47	99.03	42.82	NO
1600.	2.592	5	1.0	1.0	10000.0	60.73	79.43	32.37	NO
1700.	2.649	5	1.0	1.0	10000.0	60.73	83.79	33.40	NO
1800.	2.689	5	1.0	1.0	10000.0	60.73	88.13	34.40	NO
1900.	2.716	5	1.0	1.0	10000.0	60.73	92.45	35.40	NO
2000.	2.731	5	1.0	1.0	10000.0	60.73	96.75	36.38	NO
2100.	2.724	5	1.0	1.0	10000.0	60.73	101.03	37.25	NO
2200.	2.711	5	1.0	1.0	10000.0	60.73	105.30	38.11	NO
2300.	2.734	6	1.0	1.1	10000.0	52.00	73.22	26.11	NO
2400.	2.779	6	1.0	1.1	10000.0	52.00	76.03	26.60	NO
2500.	2.817	6	1.0	1.1	10000.0	52.00	78.82	27.09	NO
2600.	2.848	6	1.0	1.1	10000.0	52.00	81.61	27.56	NO

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SCREEN.OUT									
2700.	2.873	6	1.0	1.1	10000.0	52.00	84.39	28.03	NO
2800.	2.893	6	1.0	1.1	10000.0	52.00	87.16	28.50	NO
2900.	2.908	6	1.0	1.1	10000.0	52.00	89.92	28.96	NO
3000.	2.919	6	1.0	1.1	10000.0	52.00	92.67	29.41	NO
3500.	2.864	6	1.0	1.1	10000.0	52.00	106.30	31.26	NO
4000.	2.775	6	1.0	1.1	10000.0	52.00	119.74	32.99	NO
4500.	2.668	6	1.0	1.1	10000.0	52.00	133.02	34.61	NO
5000.	2.555	6	1.0	1.1	10000.0	52.00	146.14	36.16	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:
 246. 5.697 3 5.0 5.0 1600.0 24.86 28.95 17.47 NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	5.697	246.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN Baker PW Flare

02/22/13
10:11:50

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit- Flare Baker PW

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = FLARE
EMISSION RATE (G/S) = .125800
FLARE STACK HEIGHT (M) = 9.1440
TOT HEAT RLS (CAL/S) = 5600.00
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION = RURAL
EFF RELEASE HEIGHT (M) = 9.4262
BUILDING HEIGHT (M) = .0000
MIN HORIZ BLDG DIM (M) = .0000
MAX HORIZ BLDG DIM (M) = .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .093 M**4/S**3; MOM. FLUX = .057 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	13.03	.51	.35	NO
100.	94.72	3	1.0	1.0	320.0	13.03	12.51	7.51	NO
200.	94.18	4	1.0	1.0	320.0	13.03	15.60	8.56	NO
300.	81.92	4	1.0	1.0	320.0	13.03	22.63	12.14	NO
400.	61.79	4	1.0	1.0	320.0	13.03	29.47	15.30	NO
500.	46.93	4	1.0	1.0	320.0	13.03	36.16	18.33	NO
600.	36.56	4	1.0	1.0	320.0	13.03	42.73	21.24	NO
700.	29.22	4	1.0	1.0	320.0	13.03	49.20	24.06	NO
800.	29.20	6	1.0	1.0	10000.0	20.59	27.82	12.39	NO
900.	29.55	6	1.0	1.0	10000.0	20.59	30.94	13.37	NO
1000.	29.20	6	1.0	1.0	10000.0	20.59	34.03	14.31	NO
1100.	28.29	6	1.0	1.0	10000.0	20.59	37.10	15.16	NO
1200.	27.21	6	1.0	1.0	10000.0	20.59	40.14	15.98	NO
1300.	26.03	6	1.0	1.0	10000.0	20.59	43.16	16.78	NO
1400.	24.83	6	1.0	1.0	10000.0	20.59	46.16	17.55	NO
1500.	23.65	6	1.0	1.0	10000.0	20.59	49.13	18.31	NO
1600.	22.49	6	1.0	1.0	10000.0	20.59	52.09	19.05	NO
1700.	21.39	6	1.0	1.0	10000.0	20.59	55.03	19.77	NO
1800.	20.35	6	1.0	1.0	10000.0	20.59	57.96	20.48	NO
1900.	19.36	6	1.0	1.0	10000.0	20.59	60.86	21.18	NO
2000.	18.43	6	1.0	1.0	10000.0	20.59	63.76	21.86	NO
2100.	17.58	6	1.0	1.0	10000.0	20.59	66.63	22.44	NO
2200.	16.78	6	1.0	1.0	10000.0	20.59	69.50	23.00	NO
2300.	16.03	6	1.0	1.0	10000.0	20.59	72.35	23.56	NO
2400.	15.34	6	1.0	1.0	10000.0	20.59	75.19	24.10	NO
2500.	14.69	6	1.0	1.0	10000.0	20.59	78.01	24.63	NO
2600.	14.09	6	1.0	1.0	10000.0	20.59	80.83	25.16	NO

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SCREEN Baker PW Flare									
2700.	13.52	6	1.0	1.0	10000.0	20.59	83.63	25.67	NO
2800.	12.99	6	1.0	1.0	10000.0	20.59	86.42	26.18	NO
2900.	12.49	6	1.0	1.0	10000.0	20.59	89.21	26.67	NO
3000.	12.02	6	1.0	1.0	10000.0	20.59	91.98	27.16	NO
3500.	10.12	6	1.0	1.0	10000.0	20.59	105.70	29.16	NO
4000.	8.690	6	1.0	1.0	10000.0	20.59	119.21	31.00	NO
4500.	7.573	6	1.0	1.0	10000.0	20.59	132.54	32.73	NO
5000.	6.684	6	1.0	1.0	10000.0	20.59	145.71	34.36	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

125.	103.8	3	1.0	1.0	320.0	13.03	15.46	9.25	NO
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DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	103.8	125.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN.OUT

02/07/13
12:40:35*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - SMSS FLARE BD

SIMPLE TERRAIN INPUTS:

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SOURCE TYPE           =          FLARE
EMISSION RATE (G/S)   =          .125800
FLARE STACK HEIGHT (M) =          9.1440
TOT HEAT RLS (CAL/S)  =          122500.
RECEPTOR HEIGHT (M) =          .0000
URBAN/RURAL OPTION    =          RURAL
EFF RELEASE HEIGHT (M) =          10.3774
BUILDING HEIGHT (M)   =          .0000
MIN HORIZ BLDG DIM (M) =          .0000
MAX HORIZ BLDG DIM (M) =          .0000

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THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 2.031 M**4/S**3; MOM. FLUX = 1.239 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	46.73	.93	.86	NO
100.	10.05	2	5.0	5.0	1600.0	17.65	19.38	10.81	NO
200.	11.72	3	3.5	3.5	1120.0	20.75	23.81	14.34	NO
300.	10.87	3	2.0	2.0	640.0	28.54	34.68	20.98	NO
400.	10.21	4	3.0	3.0	960.0	22.46	29.66	15.65	NO
500.	9.687	4	2.5	2.5	800.0	24.88	36.38	18.76	NO
600.	9.040	4	2.0	2.0	640.0	28.50	43.03	21.83	NO
700.	8.362	4	2.0	2.0	640.0	28.50	49.46	24.59	NO
800.	7.857	4	1.5	1.5	480.0	34.54	56.00	27.66	NO
900.	7.344	4	1.5	1.5	480.0	34.54	62.27	30.26	NO
1000.	6.789	4	1.5	1.5	480.0	34.54	68.48	32.83	NO
1100.	6.331	4	1.0	1.0	320.0	46.63	75.03	35.66	NO
1200.	6.048	4	1.0	1.0	320.0	46.63	81.10	37.55	NO
1300.	5.758	4	1.0	1.0	320.0	46.63	87.14	39.39	NO
1400.	5.470	4	1.0	1.0	320.0	46.63	93.13	41.18	NO
1500.	5.190	4	1.0	1.0	320.0	46.63	99.09	42.94	NO
1600.	4.924	4	1.0	1.0	320.0	46.63	105.01	44.66	NO
1700.	5.093	6	1.0	1.0	10000.0	41.40	55.65	21.43	NO
1800.	5.239	6	1.0	1.0	10000.0	41.40	58.54	22.09	NO
1900.	5.353	6	1.0	1.0	10000.0	41.40	61.42	22.74	NO
2000.	5.439	6	1.0	1.0	10000.0	41.40	64.29	23.37	NO
2100.	5.460	6	1.0	1.0	10000.0	41.40	67.14	23.91	NO
2200.	5.465	6	1.0	1.0	10000.0	41.40	69.99	24.44	NO
2300.	5.457	6	1.0	1.0	10000.0	41.40	72.82	24.97	NO
2400.	5.437	6	1.0	1.0	10000.0	41.40	75.64	25.48	NO
2500.	5.409	6	1.0	1.0	10000.0	41.40	78.45	25.98	NO
2600.	5.372	6	1.0	1.0	10000.0	41.40	81.25	26.48	NO

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SCREEN.OUT									
2700.	5.328	6	1.0	1.0	10000.0	41.40	84.04	26.97	NO
2800.	5.279	6	1.0	1.0	10000.0	41.40	86.82	27.45	NO
2900.	5.226	6	1.0	1.0	10000.0	41.40	89.59	27.93	NO
3000.	5.169	6	1.0	1.0	10000.0	41.40	92.35	28.40	NO
3500.	4.803	6	1.0	1.0	10000.0	41.40	106.02	30.31	NO
4000.	4.451	6	1.0	1.0	10000.0	41.40	119.50	32.09	NO
4500.	4.126	6	1.0	1.0	10000.0	41.40	132.80	33.76	NO
5000.	3.830	6	1.0	1.0	10000.0	41.40	145.94	35.34	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

200.	11.72	3	3.5	3.5	1120.0	20.75	23.81	14.34	NO
------	-------	---	-----	-----	--------	-------	-------	-------	----

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	11.72	200.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN Flare sugarkane COND

02/22/13
10:15:08*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy Unit - SMSS Flare sugarkane Cond

SIMPLE TERRAIN INPUTS:

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SOURCE TYPE           =          FLARE
EMISSION RATE (G/S)   =          .125800
FLARE STACK HEIGHT (M) =          9.1440
TOT HEAT RLS (CAL/S)  =          394100.
RECEPTOR HEIGHT (M) =          .0000
URBAN/RURAL OPTION    =          RURAL
EFF RELEASE HEIGHT (M) =          11.3001
BUILDING HEIGHT (M)   =          .0000
MIN HORIZ BLDG DIM (M) =          .0000
MAX HORIZ BLDG DIM (M) =          .0000

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THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 6.534 M**4/S**3; MOM. FLUX = 3.984 M**4/S**2.

*** FULL METEOROLOGY ***

 *** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	98.12	1.30	1.24	NO
100.	1.381	3	10.0	10.1	3200.0	19.95	12.59	7.66	NO
200.	4.419	3	8.0	8.1	2560.0	22.11	23.82	14.36	NO
300.	4.287	3	5.0	5.1	1600.0	28.60	34.65	20.92	NO
400.	3.913	4	8.0	8.1	2560.0	22.05	29.61	15.57	NO
500.	3.671	4	5.0	5.1	1600.0	28.49	36.48	18.94	NO
600.	3.567	4	5.0	5.1	1600.0	28.49	43.00	21.77	NO
700.	3.347	4	4.5	4.6	1440.0	30.41	49.49	24.65	NO
800.	3.139	4	4.0	4.1	1280.0	32.79	55.91	27.48	NO
900.	2.954	4	3.5	3.6	1120.0	35.86	62.28	30.29	NO
1000.	2.785	4	3.0	3.1	960.0	39.96	68.62	33.12	NO
1100.	2.612	4	3.0	3.1	960.0	39.96	74.76	35.09	NO
1200.	2.461	4	2.5	2.5	800.0	45.69	81.04	37.41	NO
1300.	2.337	4	2.5	2.5	800.0	45.69	87.07	39.25	NO
1400.	2.216	4	2.5	2.5	800.0	45.69	93.07	41.05	NO
1500.	2.099	4	2.5	2.5	800.0	45.69	99.03	42.81	NO
1600.	2.008	4	2.0	2.0	640.0	54.29	105.21	45.14	NO
1700.	2.037	5	1.0	1.0	10000.0	66.08	84.04	34.04	NO
1800.	2.091	5	1.0	1.0	10000.0	66.08	88.37	35.03	NO
1900.	2.134	5	1.0	1.0	10000.0	66.08	92.68	36.00	NO
2000.	2.166	5	1.0	1.0	10000.0	66.08	96.97	36.97	NO
2100.	2.178	5	1.0	1.0	10000.0	66.08	101.24	37.83	NO
2200.	2.184	5	1.0	1.0	10000.0	66.08	105.50	38.67	NO
2300.	2.185	5	1.0	1.0	10000.0	66.08	109.74	39.51	NO
2400.	2.180	5	1.0	1.0	10000.0	66.08	113.97	40.33	NO
2500.	2.172	5	1.0	1.0	10000.0	66.08	118.18	41.14	NO
2600.	2.171	6	1.0	1.1	10000.0	56.39	81.79	28.08	NO

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			SCREEN	Flare	Sugarkane	COND				
2700.	2.204	6	1.0	1.1	10000.0	56.39	84.56	28.54	NO	
2800.	2.232	6	1.0	1.1	10000.0	56.39	87.32	29.00	NO	
2900.	2.257	6	1.0	1.1	10000.0	56.39	90.08	29.45	NO	
3000.	2.278	6	1.0	1.1	10000.0	56.39	92.82	29.89	NO	
3500.	2.283	6	1.0	1.1	10000.0	56.39	106.43	31.71	NO	
4000.	2.251	6	1.0	1.1	10000.0	56.39	119.86	33.42	NO	
4500.	2.197	6	1.0	1.1	10000.0	56.39	133.13	35.03	NO	
5000.	2.131	6	1.0	1.1	10000.0	56.39	146.24	36.55	NO	

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:
 218. 4.474 3 8.0 8.1 2560.0 22.11 25.86 15.55 NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	4.474	218.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

SCREEN sugarkane PW flare

02/22/13
10:17:02

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Sugarkane - Baker Dehy unit- SMSS Flare Sugarkane PW

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = FLARE
EMISSION RATE (G/S) = .125800
FLARE STACK HEIGHT (M) = 9.1440
TOT HEAT RLS (CAL/S) = 11200.0
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION = RURAL
EFF RELEASE HEIGHT (M) = 9.5371
BUILDING HEIGHT (M) = .0000
MIN HORIZ BLDG DIM (M) = .0000
MAX HORIZ BLDG DIM (M) = .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .186 M**4/S**3; MOM. FLUX = .113 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	15.60	.56	.42	NO
100.	67.18	2	1.0	1.0	320.0	15.60	19.34	10.75	NO
200.	65.07	3	1.0	1.0	320.0	15.60	23.68	14.14	NO
300.	63.97	4	1.0	1.0	320.0	15.60	22.68	12.22	NO
400.	52.76	4	1.0	1.0	320.0	15.60	29.51	15.37	NO
500.	42.00	4	1.0	1.0	320.0	15.60	36.19	18.38	NO
600.	33.64	4	1.0	1.0	320.0	15.60	42.75	21.28	NO
700.	27.38	4	1.0	1.0	320.0	15.60	49.22	24.10	NO
800.	22.66	4	1.0	1.0	320.0	15.60	55.60	26.84	NO
900.	20.99	6	1.0	1.0	10000.0	23.61	31.04	13.59	NO
1000.	21.55	6	1.0	1.0	10000.0	23.61	34.12	14.52	NO
1100.	21.51	6	1.0	1.0	10000.0	23.61	37.18	15.36	NO
1200.	21.20	6	1.0	1.0	10000.0	23.61	40.22	16.17	NO
1300.	20.72	6	1.0	1.0	10000.0	23.61	43.23	16.95	NO
1400.	20.13	6	1.0	1.0	10000.0	23.61	46.22	17.72	NO
1500.	19.47	6	1.0	1.0	10000.0	23.61	49.19	18.47	NO
1600.	18.78	6	1.0	1.0	10000.0	23.61	52.15	19.21	NO
1700.	18.08	6	1.0	1.0	10000.0	23.61	55.09	19.93	NO
1800.	17.38	6	1.0	1.0	10000.0	23.61	58.01	20.63	NO
1900.	16.70	6	1.0	1.0	10000.0	23.61	60.91	21.32	NO
2000.	16.04	6	1.0	1.0	10000.0	23.61	63.80	22.00	NO
2100.	15.40	6	1.0	1.0	10000.0	23.61	66.68	22.57	NO
2200.	14.79	6	1.0	1.0	10000.0	23.61	69.54	23.13	NO
2300.	14.21	6	1.0	1.0	10000.0	23.61	72.39	23.68	NO
2400.	13.67	6	1.0	1.0	10000.0	23.61	75.23	24.22	NO
2500.	13.15	6	1.0	1.0	10000.0	23.61	78.05	24.75	NO
2600.	12.67	6	1.0	1.0	10000.0	23.61	80.86	25.27	NO

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SCREEN sugarkane Pw flare									
2700.	12.21	6	1.0	1.0	10000.0	23.61	83.67	25.79	NO
2800.	11.77	6	1.0	1.0	10000.0	23.61	86.46	26.29	NO
2900.	11.36	6	1.0	1.0	10000.0	23.61	89.24	26.79	NO
3000.	10.97	6	1.0	1.0	10000.0	23.61	92.01	27.27	NO
3500.	9.348	6	1.0	1.0	10000.0	23.61	105.73	29.26	NO
4000.	8.095	6	1.0	1.0	10000.0	23.61	119.24	31.10	NO
4500.	7.106	6	1.0	1.0	10000.0	23.61	132.56	32.82	NO
5000.	6.308	6	1.0	1.0	10000.0	23.61	145.73	34.44	NO
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:									
151.	72.64	3	1.0	1.0	320.0	15.60	18.42	11.05	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	72.64	151.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

Oil and Gas Standard Permit and Permit By Rule Refined-Screening Modeling Guidelines

The modeling tables in the Oil and Gas Standard Permit and Permit by Rule (PBR) are only one tool the applicant may use to demonstrate emissions from Oil and Gas Site (OGS) located in the Barnett Shale are acceptable under the Standard Permit and PBR. The modeling performed to create the modeling tables demonstrates the Standard Permit and PBR are protective anywhere in the Barnett Shale. In order to make the demonstration, the modeling is based on reasonably conservative assumptions and modeling techniques. If the modeling tables are too conservative for a specific OGS, the applicant may use a more refined screening modeling approach to demonstrate acceptable emissions from an OGS under the Standard Permit and PBR. The following information provides the requirements and guidance if an applicant chooses to conduct the refined screening approach. The applicant should follow the approach exactly and should not modify the approach on a case-by-case basis. However, the commission could modify the modeling guidance to resolve technical issues, clarify instructions, or allow the use of other refined dispersion models.

There are two refined screening options for demonstrating acceptable emission impacts. The first is a screening approach using the SCREEN3 model and the second is a refined screening approach using Industrial Source Complex (ISC) model. It is possible, and acceptable, that some sites may utilize a combination of SCREEN3 and ISC when completing the impacts review.

SCREEN3 Model Setup Guidelines

The information contained in this section will provide guidance for applicants utilizing SCREEN3 in the protectiveness reviews for the Oil and Gas PBR and Standard Permit. If any of the conditions outlined in this guidance cannot be met, then this approach cannot be used.

Control Options

- The Regulatory default option must be selected.
- The Flat terrain choice must be used.
- Rural or urban dispersion options may be used based on the land use in the vicinity of the sources to be permitted.
- A land use analysis must be conducted to determine the majority land-use type within 3 kilometers (km) of the sources to be permitted.
- If the land-use designation is clear (about 70 percent or more of the total land-use is either urban or rural), then no further refinement is required and the model should be run with the appropriate land-use designation.
- If the land-use designation is not clear, the model should be run twice, once with each option and the higher of the two predicted concentrations should be reported.

Source Options

- Emissions can be represented as either point sources, point source using pseudo point parameters, area source, or as a flare.
- Use a point source with pseudo-point parameters for individual fugitive sources and for any sources that do not release to the atmosphere through standard stacks (such as stacks or vents with rain caps, horizontal releases).

- Use area source to characterize emissions from fugitive sources and for any sources that do not release to the atmosphere through standard stacks. The area and release height must represent sources or activities that occur at the same time and height. The ratio of length to width for the area source cannot be greater than 10:1. Multiple area sources can be used as applicable to meet area and release height restrictions.
- Flares may be modeled using the flare source type in SCREEN3 or by calculating the effective stack diameter and using the parameters listed in the ISC model setup guideline. The SCREEN3 flare option assumes an effective stack gas exit velocity (vs) of 20 m/s and an effective stack gas exit temperature (Ts) of 1,273 Kelvin, and calculates an effective stack diameter based on the heat release rate. Enclosed vapor combustion units should not be modeled with the preceding parameters but instead with stack parameters that reflect the physical characteristics of the unit.

Meteorology

- The SCREEN3 model defaults of full meteorology, 10-meter anemometer height, and regulatory mixing height are required.

Receptors

- Model receptors should be placed to meet the definitions listed in 30 TAC §106.352(b)(2), 30 TAC §106.352(k), and sections (b)(2) and (k) of the standard permit.
- The distance to the nearest receptor should be used to demonstrate compliance for the health effects analysis.
- The starting receptor for the state property line and NAAQS analyses should be placed at the nearest property line. The ending receptor should be located at a 1/4 mile, 1/2 mile, or 1 mile from a project for PBR level 1, PBR Level 2, or the standard permit, respectively.

Downwash

- Downwash is generally not applicable for OGS located in rural areas. Downwash may be appropriate for OGS that could be affected by large buildings located in urban areas. Generally, small tanks, storage sheds, and engines are not large enough to cause downwash effects and should not be considered in the analysis.

Output

- The maximum predicted concentration must be used to compare against the applicable ESL, NAAQS, or state ambient air standard.

- The following conversion factors can be used to convert 1-hour concentrations from SCREEN3 to averaging times greater than 1-hour:

Averaging Time	Multiplying Factor
3 hour	0.9
24 hour	0.4
Annual	0.08

ISC Model Setup Guidelines

The information contained in this section will provide guidance for applicants utilizing ISC in the protectiveness reviews for the Oil and Gas PBR and Standard Permits. The latest version of ISC-Prime must be used in the analysis. If any of the conditions outlined in this guidance cannot be met, then this approach cannot be used.

Control Options

- The Regulatory default option must be selected.
- The Flat terrain choice must be used.
- Plume depletion and deposition options are not allowed
- Rural or urban dispersion options may be used based on the land use in the vicinity of the sources to be permitted.
- A land use analysis must be conducted to determine the majority land-use type within 3 km of the sources to be permitted.
- If the land-use designation is clear (about 70 percent or more of the total land-use is either urban or rural), then no further refinement is required and the model should be run with the appropriate land-use designation.
- If the land-use designation is not clear, the model should be run twice, once with each option and the higher of the two predicted concentrations should be reported.

Source Options

- Emissions can be represented as either point sources, point source using pseudo point parameters, area source, or as a flare.
- Use a point source with pseudo-point parameters for individual fugitive sources and for any sources that do not release to the atmosphere through standard stacks (such as stacks or vents with rain caps, horizontal releases).
- Use area source to characterize emissions from fugitive sources and for any sources that do not release to the atmosphere through standard stacks. The area and release height must represent sources or activities that occur at the same time and height. The ratio of length to width for the area source cannot be greater than 10:1. Multiple area sources can be used as applicable to meet area and release height restrictions.

- Flares should be modeled with the following parameters: effective stack exit velocity of 20 meters per second; effective stack exit temperature of 1273 Kelvin; actual height of the flare tip. The effective stack diameter (in meters) should be calculated using the following equation: $D = \sqrt{(10-6q_n)}$ and $q_n = q(1 - 0.048\sqrt{MW})$ Where: q = gross heat release in cal/sec; q_n = net heat release in cal/sec; and MW = weighted (by volume) average molecular weight of the compound being flared.

Meteorology

- The ADMT prepared meteorological data sets available at www.tceq.state.tx.us/permitting/air/modeling/admtmet.html must be used in the modeling analysis.
- The following table lists the meteorological data sets that should be used for projects located in the corresponding County

Counties	Surface Data	Upper-air Data
Cooke, Dallas, Denton, Ellis, Hood, Johnson, Parker, Somervell, Tarrant, Wise	Dallas-Fort Worth	Stephenville
Archer, Clay, Montague	Wichita Falls	Stephenville
Bosque, Coryell, Hill	Waco	Stephenville
Comanche, Hamilton	San Angelo	Stephenville
Eastland, Erath, Jack, Palo Pinto, Shackelford, Stephens	Abilene	Stephenville

- The required year is 1988 when using one year of meteorology data,
- Only one year of data is required. However, the entire five year data set may be used for NAAQS pollutants.
- The actual anemometer height must be used for each airport location. Anemometer heights can be found at the following URL:
www.tceq.state.tx.us/assets/public/permitting/air/memos/anemom96.pdf

Receptors

- Model receptors should be placed to meet the definitions listed in 30 TAC §106.352(b)(2), 30 TAC §106.352(k), and sections (b)(2) and (k) of the standard permit.
- Model receptors should be placed at all locations defined as a receptor within a 1/4 mile, 1/2 mile, or 1 mile from a project for PBR level 1, PBR Level 2, or the standard permit, respectively, to demonstrate compliance with the health effects analysis.
- In addition to meeting the requirements in 30 TAC §106.352(b)(2), 30 TAC §106.352(k), and sections (b)(2) and (k) of the standard permit, the following

receptor grid design should be used when conducting a NAAQS or state property line analysis:

PBR Level 1

- Tight receptors - receptors beginning at the property line and spaced 50 feet apart extending out to a distance of 1/4 mile (1320 feet) from the property line

PBR Level 2

- Tight receptors - receptors beginning at the property line and spaced 50 feet apart extending out to a distance of 1/4 mile (1320 feet) from the property line
- Fine receptors - receptors spaced 300 feet apart beginning at 1/4 mile (1320 feet) from the property line and extending out to a distance of 1/2 mile (2640 feet) from the property line

Standard Permit

- Tight receptors - receptors beginning at the property line and spaced 50 feet apart extending out to a distance of 1/4 mile (1320 feet) from the property line
- Fine receptors - receptors spaced 300 feet apart beginning at 1/4 mile (1320 feet) from the property line and extending out to a distance of 1/2 mile (2640 feet) from the property line
- Medium receptors - receptors spaced 1500 feet apart beginning at 1/2 mile (2640 feet) from the property line and extending out to a distance of extending out to a distance of 1 mile (5280 feet)

Downwash

- Downwash is generally not applicable for OGS located in rural areas. Downwash may be appropriate for OGS that could be affected by large buildings located in urban areas. Generally, small tanks, storage sheds, and engines are not large enough to cause downwash effects and should not be considered in the analysis.
- The latest version of BPIP-Prime should be used to calculate downwash parameters if downwash is appropriate.

Coordinate System

- Enter receptor locations, source locations, and building location (if necessary) in UTM coordinates
- UTM coordinates in datum NAD27 or NAD83 must be used. Make certain that all of the coordinates originated in, or are converted to, the same horizontal datum. Applicable UTM zone for the Barnett Shale is zone 14 (between 102 and 96 degrees longitude).
- Coordinate systems based on plant coordinates, applicant-developed coordinate systems, or polar grids will not be accepted.

Output

- The maximum predicted concentration must be used to compare against the applicable ESL, NAAQS, or state ambient air standard when using one year of meteorological data.
- The *high*, second high may be used when modeling with 5 years of meteorology data for the SO₂ 3-hr, SO₂ 24-hr, SO₂ annual, and NO₂ annual NAAQS.
- The form of the standard may be used when modeling with 5 years of meteorology data for the SO₂ and NO₂ 1-hr NAAQS.
- The modeling form of the standard for the 1-hr NO₂ NAAQS is based on the 5-year average of the annual 98th percentile of the daily maximum 1-hour concentrations.
- The modeling form of the standard for the 1-hr SO₂ is based on the 5-year average of the annual 99th percentile of the daily maximum 1-hour concentrations.

Review Type Guidelines

The following section contains the required procedures necessary to complete a health effects, NAAQS, and state property line evaluations. The applicant should follow the steps exactly and should not modify the approach on a case-by-case basis. However, the commission could modify the guidance to resolve technical issues, clarify instructions, or allow the use of more refined models.

In addition to following the approaches below, the evaluations must meet the requirements listed in 30 TAC §106.352(k) and section (k) of the standard permit, as appropriate.

Health Effects Analysis

- Compliance with the hourly ESL for benzene and annual ESL for benzene must be demonstrated at receptors within 1/4 mile, 1/2 mile, or 1 mile of a project for PBR Level 1, PBR Level 2, or the standard permit, respectively
- Model all new and modified sources -- the project.
- If the project's air contaminant maximum predicted concentration is equal to or less than 10% of the appropriate ESL, no further review is required.
- If a project's air contaminant maximum predicted concentration is greater than 10% of the appropriate ESL, compare the project's air contaminant maximum predicted concentration combined with project increases for that contaminant over a 60-month period to 25% of the appropriate ESL. If the resulting concentration is less than 25% of the appropriate ESL, no further review is required.
- A site wide analysis, including all sources emitting the regulated contaminant, must be conducted if the above requirements are not met. Multiple scenarios may be necessary to represent sources that may not operate simultaneously.
- All sources must be modeled at the maximum allowable emission rate.
- The maximum predicted concentration at each receptor should be compared to the ESL and included in the modeling report.

State Property Line Analysis

- Compliance with the state ambient air standard for SO₂ and H₂S must be demonstrated at any property line within 1/4 mile, 1/2 mile, or 1 mile of a project for PBR level 1, PBR Level 2, or the standard permit, respectively
- Model all new and modified sources-- the project.
- Compare the maximum predicted concentration from the project to the appropriate de minimis level. Compliance with the state property line standards is demonstrated if the maximum predicted concentration from the project is less than or equal to de minimis listed in the following table:

Pollutant	Averaging Time	Location	De Minimis (µg/m ³)
SO ₂	1-hr	All locations	20
H ₂ S	1-hr	If property is residential, recreational, business, or commercial	2
H ₂ S	1-hr	If property is other than residential, recreational, business, or commercial	3

- If the maximum predicted concentration from the project is greater than de minimis, a site wide analysis must be conducted.
- Model the allowable emission rate of all sources on site that emit the regulated pollutant.
- Compliance with the state property line standard is demonstrated if the maximum predicted site-wide concentration is less than or equal to the state property line standards listed in the following table:

Pollutant	Averaging Time	Location	State Property Line Standard (µg/m ³)
SO ₂	1-hr	All Locations	1021
H ₂ S	1-hr	If property is residential, recreational, business, or commercial	108
H ₂ S	1-hr	If property is other than residential, recreational, business, or commercial	162

NAAQS Analysis

- Compliance with federal ambient air standards for NO₂ and SO₂ must be demonstrated at any property line within 1/4 mile, 1/2 mile, or 1 mile of a project for PBR Level 1, PBR Level 2, or the standard permit, respectively
- Model all new and modified sources-- the project.
- Compare the maximum predicted concentration from the project to the appropriate de minimis level. Compliance with the NAAQS is demonstrated if the maximum predicted concentration from the project is less than or equal to the de minimis level listed in the following table:

Pollutant	Averaging Time	De Minimis (µg/m ³)
SO ₂	1-hr	7.8
SO ₂	3-hr	25
SO ₂	24-hr	5
SO ₂	Annual	1
NO ₂	1-hr	7.5
NO ₂	Annual	1

- If the maximum predicted concentration from the project is greater than de minimis, a site wide analysis must be conducted.
- Model the allowable emission rate of all sources on site that emit the regulated pollutant
- The maximum predicted concentration must be used when modeling with one year of meteorology data.
- The *high*, second high may be used when modeling with 5 years of meteorology data for the SO₂ 3-hr, SO₂ 24-hr, SO₂ annual, and NO₂ annual NAAQS.
- The form of the standard may be used when modeling with 5 years of meteorology data for the SO₂ and NO₂ 1-hr NAAQS.

- Add a background concentration to the predicted site wide concentration and compare the total concentration to the NAAQS. Compliance with the NAAQS is demonstrated if the total concentration is less than NAAQS listed in the following table:

Pollutant	Averaging Time	NAAQS ($\mu\text{g}/\text{m}^3$)
SO ₂	1-hr	196
SO ₂	3-hr	1300
SO ₂	24-hr	365
SO ₂	Annual	80
NO ₂	1-hr	188
NO ₂	Annual	100

- Screening background concentration values can be found at www.tceq.texas.gov/permitting/air/memos/interim_guidance_naaqs.html
- If the screening background concentration values are too conservative, contact the Air Dispersion Modeling Team at 512-239-1250 for further guidance. The applicant should be prepared to present and discuss alternative background concentrations.

Streamlining Techniques

The following section contains approaches that may be used to streamline the modeling required to demonstrate compliance with the health effects, NAAQS, or state property line analysis. The streamlining techniques are **NOT** required, but may be used to streamline the analyses.

Controlling Concentrations

Short-term standards are usually the controlling concentrations; that is, if the standard is met for the shortest time period, standards for longer averaging periods will also be met. Therefore, if the predicted concentrations from the maximum 1-hour emissions for a NAAQS or applicable state standard are at or lower than the concentrations from a longer averaging period, the demonstration is complete. For example, if the predicted 1-hour SO₂ concentration is 150 $\mu\text{g}/\text{m}^3$, the demonstration for all SO₂ NAAQS and state standards except the annual NAAQS is complete. However, the screening conversion factor of 0.08 can be used to convert the hourly concentration to an annual concentration, and in this case, the annual NAAQS will not be exceeded. Document the use of this technique in the modeling report.

Collocation of Emission Points

Collocating stacks may be appropriate for both screening and refined analyses if the individual emission points emit the same pollutant(s); have stack heights, volumetric flow rates, or stack gas exit temperatures that do not differ by more than about 20 percent; and are within about 100 meters of each other.

- Use the following equation to determine the worst-case stack: $M = (h_s V T_s)/Q$
- Where:
 - M = a parameter that accounts for the relative influence of stack height, plume rise, and emission rate on concentrations;
 - h_s = the physical stack height in meters;
 - $V = (\pi/4)d^2v_s$ = the stack gas flow rate in cubic meters per second.
 - $\Pi = \pi$
 - d = inside stack diameter in meters;
 - v_s = stack gas exit velocity in meters per second;
 - T_s = the stack gas exit temperature in Kelvin;
 - Q = pollutant emission rate in grams per second.
- The stack that has the lowest value of M is used as a representative stack.
- The sum of the emissions from all stacks is assumed to be emitted from the representative stack.

Generic Modeling Approach

This technique uses a unit emission rate (1 pound per hour) to determine if the maximum contribution from each permitted source when added together, independent of time and space, could exceed a standard or ESL. This is a conservative procedure since the maximum concentration from all sources modeled concurrently cannot be more than the sum of the maximum concentration from each source modeled separately.

- Determine a generic impact for each source by modeling each source with a unit emission rate of 1 pound per hour; the source's actual location; and the source's proposed stack parameters represented in the permit application.
- In ISC this is done by setting up a separate source group for each source.
- The SCREEN3 model can also be used for this demonstration with a separate SCREEN3 model run for each source.
- Multiply the predicted generic impact by the proposed pollutant specific emission rate for each source to calculate a maximum predicted concentration for each source.
- Sum the maximum predicted concentration for each source to get a total predicted concentration for each pollutant.
- The sum of the maximum concentrations (for each pollutant, independent of time and space) is then compared with the threshold of concern for each pollutant.

Reporting Requirements

Once the modeling exercise is complete, the modeling approach and results should be summarized in a modeling report. The modeling report should be sent to the TCEQ permit reviewer and include a CD with all modeling input files, plot files, output files and all other files of supporting information used in the modeling demonstration.

Interim 1-Hour NO ₂ Screening Background Concentrations in micrograms per cubic meter (µg/m ³) ¹			
Region / Specific County ²	Screening Background	Region / Specific County	Screening Background
1	70	10	70
		Jefferson	90
		Orange	70
2	70		
3	70	11	70
		Travis	85
4	70	12	70
Dallas	104	Brazoria	75
Ellis	85	Galveston	75
Tarrant	107	Harris	120
		Montgomery	75
5	70	13	70
Titus	90	Bexar	100
Rusk	90		
6	70	14	70
El Paso	124	Nueces	90
7	70	15	70
		Hidalgo	100
8	70	16	70
		Webb	100
9	70		
Freestone	90		
Limestone	90		

These values are conservative and based on available ambient monitoring design values (2007-2009) and may change as more research is conducted and/or data obtained.

If a value is too conservative, contact the Air Dispersion Modeling Team to determine if a more refined background concentration is available.

¹ Use the value for the region the project will be located in, or county if listed

² NAAQS in 188 µg/m³ converted from parts per billion based on standard temperature and pressure

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

TO: NSRPD Staff **DATE:** August 3, 1998
FROM: Dom Ruggeri, Team Leader
Air Dispersion Modeling Team (ADMT)
SUBJECT: Modeling Guidance for Exemption 106.512 (Formerly SE 6)

If an applicant meets the general requirements to claim an exemption under this rule, the applicant must demonstrate that emissions from an exempted source will not cause or contribute to a violation of the NO₂ NAAQS [106.512(6)]. One of the methods to show compliance with the NO₂ NAAQS involves dispersion modeling [106.512(6)(A)]. The applicant can use the following procedure to conduct the modeling demonstration:

Step 1. *Determine the long-term hourly emission rate for each source.*

Use the applicable NO₂/NO_x ratio in Figure 1: 30 TAC §106.512(6)(A) to adjust the hourly rate for each source.

Step 2. *Determine if the NO₂ de minimis is exceeded.*

Use EPA's SCREEN3 or ISCST3 model to determine if the new or modified sources' emissions will exceed the NO₂ de minimis of 1 µg/m³. If the predicted concentration is ≤ 1 µg/m³, the demonstration is complete. If not, go to Step 3.

Step 3. *Determine the background concentration from the Screening Background Concentrations table (attached).* If the predicted concentration plus background is ≤ 100 µg/m³, the demonstration is complete. If not, a full state NAAQS analysis may be required if the screening background concentration cannot be refined to a more representative value. Go to Step 4.

Step 4. *Determine if there is a NO₂ monitor in the county.* If not, go to Step 5.

Obtain a background concentration from a representative monitor in the county. Use the most recent annual concentration from the Aerometric Information Retrieval System (AIRS) [www.epa.gov/airsweb/monreps.htm] that is based on at least 6570 hours of observations.

Convert the concentration from ppm to µg/m³ by multiplying the AIRS concentration by 1887. If the predicted concentration plus the monitored background concentration is ≤ 100 µg/m³, the demonstration is complete. If not, a full state NAAQS analysis may be required. Contact the ADMT staff for modeling guidance.

Step 5. *Contact the ADMT staff for assistance in developing a representative background concentration.* If the predicted concentration plus a representative background concentration is ≤ 100 µg/m³, the demonstration is complete. If not, a full state NAAQS analysis may be required. Contact the ADMT staff for modeling guidance.

Attachment

SCREENING BACKGROUND CONCENTRATIONS

NO₂
August, 1998

Note: Use regional values unless concentrations for a specific county are provided.

Regional Background / Specific County Background - Annual Concentration (µg/m ³)							
Region 1 20	Region 2 20	Region 3 20	Region 4 20	Region 5 20	Region 6 20	Region 7 20	Region 8 20
Potter 25	Lubbock 25	Wichita 25	Collin 25	Rusk 30	El Paso 70	Ector 35	
			Dallas 55	Smith 25			
			Denton 25	Titus 30			
			Ellis 25				
			Tarrant 40				

Regional Background / Specific County Background - Annual Concentration (µg/m ³)							
Region 9 20	Region 10 20	Region 11 20	Region 12 20	Region 13 20	Region 14 20	Region 15 20	Region 16 20
Bell 40	Jefferson 35	Fayette 30	Brazoria 35	Bexar 50	Nueces 35	Cameron 30	Webb 25
Limestone 25	Orange 35	Travis 45	Chambers 25		Victoria 25	Hidalgo 30	
McLennan 30		Williamson 25	Ft. Bend 35				
Robertson 35			Galveston 30				
			Harris 60				
			Montgomery 25				

**ATTACHMENT 6
SUPPORTING DOCUMENTATION**

OIL AND GAS STANDARD PERMIT REGISTRATION

SUGARKANE CTB – BAKER DEHY UNIT

BURLINGTON RESOURCES OIL & GAS COMPANY LP

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Facility/Compound Specific Fugitive Emission Factors

Equipment/ Service	Ethylene Oxide ¹	Phosgene ²	Butadiene ³	Petroleum Marketing Terminal	Oil and Gas Production Operations ⁵				Refinery ⁶
					Gas	Heavy Oil <20° API	Light Oil >20°	Water/Li ght Oil	
Valves					0.00992	0.0000185	0.0055	0.000216	
Gas/Vapor	0.000444	0.00000216	0.001105	0.0000287					0.059
Light Liquid	0.00055	0.00000199	0.00314	0.0000948					0.024
Heavy Liquid				0.0000948					0.00051
Pumps	0.042651	0.0000201	0.05634		0.00529	0.00113 ¹⁰	0.02866	0.000052	
Light Liquid				0.00119					0.251
Heavy Liquid				0.00119					0.046
Flanges/Connectors	0.000555	0.00000011	0.000307		0.00086	0.00000086	0.000243	0.000006	0.00055
Gas/Vapor				0.000092604					
Light Liquid				0.00001762					
Heavy Liquid				0.0000176					
Compressors	0.000767		0.000004		0.0194	0.0000683	0.0165	0.0309	1.399
Relief Valve	0.000165	0.0000162	0.02996		0.0194	0.0000683	0.0165	0.0309	0.35
Open-ended Lines ⁷	0.001078	0.00000007	0.00012		0.00441	0.000309	0.00309	0.00055	0.0051
Sampling	0.000088		0.00012						0.033
Connectors					0.00044	0.0000165	0.000463	0.000243	
Other ⁹					0.0194	0.0000683	0.0165	0.0309	
Gas/Vapor				0.000265					
Light/Heavy Liquid				0.000287					
Process Drains					0.0194	0.0000683	0.0165	0.0309	0.07

Table Notes: All factors are in units of (lb/hr)/component.

1. Monitoring must occur at a leak definition of 500 ppmv. No additional control credit can be applied to these factors. Emission factors are from EOIC Fugitive Emission Study, Summer 1988.
2. Monitoring must occur at a leak definition of 50 ppmv. No additional control credit can be applied to these factors. Emission factors are from Phosgene Panel Study, Summer 1988.
3. Monitoring must occur at a leak definition of 100 ppmv. No additional control credit can be applied to these factors. Emission factors are from Randall, J. L., et al., Radian Corporation. Fugitive Emissions from the 1,3-butadiene Production Industry: A Field Study. Final Report. Prepared for the 1,3-Butadiene Panel of the Chemical Manufacturers Association. April 1989.
4. Control credit is included in the factor; no additional control credit can be applied to these factors. Monthly AVO inspection required.
5. Factors give the total organic compound emission rate. Multiply by the weight percent of non-methane, non-ethane organics to get the VOC emission rate.
6. Factors are taken from EPA Document EPA-453/R-95-017, November 1995, Page 2-13.
7. The 28 Series quarterly LDAR programs require open-ended lines to be equipped with a cap, blind flange, plug, or a second valve. If so equipped, open-ended lines may be given a 100% control credit.
8. Emission factor for Sampling Connections is in terms of pounds per hour per sample taken.

9. For Petroleum Marketing Terminals "Other" includes any component excluding fittings, pumps, and valves. For Oil and Gas Production Operations, "Other" includes diaphragms, dump arms, hatches, instruments, meters, polished rods, and vents.
10. No Heavy Oil - Pump factor was derived during the API study. The factor is the SOCMI without C₂ Heavy Liquid - Pump factor with a 93% reduction credit for the physical inspection.

Tank Truck Loading of Crude Oil or Condensate

Scope: Tank Truck Loading activities at loading terminals

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. Crude oil or condensate is transported from oil and gas sites to a refinery or other refining operations by tankers, barges, rail tank cars, tank trucks, and pipelines.

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations (for marine loading please review Marine Loading of Crude Oil and Condensate Guidance Document). Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is, therefore, a function of the following parameters:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

Tank truck loading operations can be divided into three general categories: A) atmospheric trucks, B) pressure trucks used in atmospheric service, and C) pressure trucks. The type of connection that is used in the loading procedure will be considered to determine the collection efficiency. "Quick connects" are clamp type connections that are not bolted or flanged. "Quick connects" can be used with atmospheric trucks. Hard-piped connections are bolted or flanged to the receiving vessel. Hard-piped connections should be used with pressure trucks to achieve its maximum collection efficiency. Atmospheric trucks must be leak checked according to NSPS Subpart XX to achieve its maximum collection efficiency.

Tank Truck Loading Authorizations

All stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water that satisfy the general conditions of Title 30, Texas Administrative Code (30 TAC), Section 106.4, and the specific conditions of 30 TAC Section 106.352 are permitted by rule. The commission also has available rule language in an easy-to-read format for the permit by rule.

For all new projects and dependent facilities not located in the Barnett Shale counties, the current 106.352 subsection (I) is applicable, which contains the previous requirements of 106.352.

For projects located in one of the Barnett Shale counties which are constructed or modified on or after April 1, 2011 subsections (a)-(k) apply.

Other permit by rules which may be used for tank truck loading but are not commonly seen are 106.261, 106.262, 106.472, and 106.473.

If a site does not qualify for a PBR, it may be authorized by a standard permit. Sites constructed prior to April 1, 2011 may be authorized using the Oil and Gas Standard Permit (30 TAC 116.620, effective January 11, 2000). For sites in one of the Barnett Shale counties constructed or modified on or after April 1, 2011, the site is subject to the requirements of the Air Quality Standard Permit for Oil and Gas Handling and Production Facilities.

Emission Calculations

Loading calculations are listed in AP-42, Chapter 5, Section 5.2: Transportation and Marketing of Petroleum Liquids.

Submerged tank truck loading is the minimum level of control required. The two types of submerge loading are the submerged fill pipe method and the bottom loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. During most of submerged loading by both methods, the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly during submerged loading, resulting in much lower vapor generation than encountered during splash loading.

The saturation factor, S, represents the expelled vapor's fractional approach to saturation, and it accounts for the variations observed in emission rates from the different unloading and loading methods. The loading calculation requires the use of a Saturation Factor (S factor) listed in Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses.

Submerged loading: dedicated normal service, S factor = 0.6

The S factor of 0.6 should be used if the tank truck is in "dedicated normal service". Dedicated normal service means the tank truck is used to transport only one product or products with similar characteristics (petroleum products with similar API gravity, molecular weight, vapor pressure).

Submerged Loading: dedicated vapor balance, S factor = 1.0

The S factor of 1.0 should be used if the loading vapors are returned back to the tank truck when it is unloaded to a storage tank or other vessel.

Emissions from loading petroleum liquid can be estimated using the following expression:

Where:

$$L_L = 12.46 \frac{SPM}{T}$$

- L_L = loading loss, pounds per 1000 gallons (lb/103 gal) of liquid loaded
- S = a saturation factor (see Table 5.2-1)

- P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
- M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
- T = temperature of bulk liquid loaded, °R (°F + 460)

Emissions are broken down into short-term emissions (lb/hr) and annual emissions (tons/year). Short-term emissions should be estimated by using the maximum expected vapor pressure and temperature of the compound being loaded and the maximum expected pumping rate being used to fill the container (loading tank truck). Annual emissions should be estimated by using the average annual temperature and corresponding vapor pressure of the compound and the expected annual throughput of the compound.

Capture/Collection techniques and efficiency

The overall reduction efficiency should account for the capture efficiency of the collection system as well as both the control efficiency and any downtime of the control device. Measures to reduce loading emissions include selection of alternate loading methods and application of vapor recovery equipment.

Please note, not all of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 98.7 percent for tanker trucks passing an annual leak test per EPA standards. A collection efficiency of 70 percent should be assumed for trucks which are not leak tested.

- 70% capture/collection efficiency if not leak tested
- 98.7% capture/collection efficiency if leak tested based on EPA standards (NSPS Subpart XX)
- 100% capture/collection efficiency if a blower system is installed which will produce a vacuum in the tank truck during all loading operations. A pressure/vacuum gauge shall be installed on the suction side of the loading rack blower system adjacent to the truck being loaded to verify a vacuum in that vessel. Loading shall not occur unless there is a vacuum of at least 1.5 inch water column being maintained by the vacuum-assist vapor collection system when loading trucks. The vacuum shall be recorded every 15 minutes during loading.

Uncollected Loading Emissions

Uncollected loading emissions are referred to as loading fugitives and are listed as a separate emission point or source. Uncollected loading emissions (LLF) can be estimated using the following expression:

$$L_{LF} = (L_L) \frac{(1 - \text{Collection Efficiency})}{100}$$

Control techniques and control efficiencies

Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate calculated in the loading loss equation (LL) by an overall reduction efficiency term:

$$\text{Emissions} = (L_L) \left(\frac{\text{Collection Efficiency}}{100} \right) \left(1 - \frac{\text{Control Efficiency}}{100} \right)$$

- Flares – Flares must meet 40 CFR 60.18 requirements of minimum heating value of waste gas and a maximum flare tip velocity. Flares can have a control efficiency of 98% or 99% for the following compounds: methanol, ethanol, propanol, ethylene oxide, and propylene oxide. The agency highly encourages the consideration of variable speed blowers when a control efficiency of > 98% is claimed for a steam – assisted flare to reduce over steaming of the flare which could affect the control efficiency.
- Thermal oxidizers – must be designed for the variability of the waste gas stream and basic monitoring which consists of thermocouple or infrared monitor that indicates the device is working. Control efficiencies range from 95% - <99%.
- Carbon Systems – Can claim up to a 98% control efficiency. The carbon system must have an alarm system that will prevent break through.
- Vapor Recovery Units (VRU) – Can claim up to 100% control. Designed systems claiming 100% control must submit the requirements found in the Vapor Recovery Unit Capture/Control Guidance.

Note: Loading cannot occur while the control system is off-line.

Vapor balancing is NOT a form of control; it is only a capture technique.

Flare Emission Factors

The usual flare destruction efficiencies and emission factors are provided in Table 4. The high-Btu waste streams referred to in the table have a heating value greater than 1,000 Btu/scf.

Flare Destruction Efficiencies

Claims for destruction efficiencies greater than those listed in Table 4 will be considered on a case-by-case basis. The applicant may make one of the three following demonstrations to justify the higher destruction efficiency: (1) general method, (2) 99.5 percent justification, or (3) flare stack sampling.

Table 4. Flare Factors

Waste Stream	Destruction/Removal Efficiency (DRE)		
VOC	98 percent (generic) 99 percent for compounds containing no more than 3 carbons that contain no elements other than carbon and hydrogen in addition to the following compounds: methanol, ethanol, propanol, ethylene oxide and propylene oxide		
H ₂ S	98 percent		
NH ₃	case by case		
CO	case by case		
Air Contaminants	Emission Factors		
thermal NO _x	steam-assist:	high Btu low Btu	0.0485 lb/MMBtu 0.068 lb/MMBtu
	other:	high Btu low Btu	0.138 lb/MMBtu 0.0641 lb/MMBtu
fuel NO _x	NO _x is 0.5 wt percent of inlet NH ₃ , other fuels case by case		
CO	steam-assist:	high Btu low Btu	0.3503 lb/MMBtu 0.3465 lb/MMBtu
	other:	high Btu low Btu	0.2755 lb/MMBtu 0.5496 lb/MMBtu
PM	none, required to be smokeless		
SO ₂	100 percent S in fuel to SO ₂		

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES^a
(SCC 2-02-002-54)

Pollutant	Emission Factor (lb/MMBtu) ^b (fuel input)	Emission Factor Rating
Criteria Pollutants and Greenhouse Gases		
NO _x ^c 90 - 105% Load	4.08 E+00	B
NO _x ^c <90% Load	8.47 E-01	B
CO ^c 90 - 105% Load	3.17 E-01	C
CO ^c <90% Load	5.57 E-01	B
CO ₂ ^d	1.10 E+02	A
SO ₂ ^e	5.88 E-04	A
TOC ^f	1.47 E+00	A
Methane ^g	1.25 E+00	C
VOC ^h	1.18 E-01	C
PM10 (filterable) ⁱ	7.71 E-05	D
PM2.5 (filterable) ⁱ	7.71 E-05	D
PM Condensable ^j	9.91 E-03	D
Trace Organic Compounds		
1,1,2,2-Tetrachloroethane ^k	<4.00 E-05	E
1,1,2-Trichloroethane ^k	<3.18 E-05	E
1,1-Dichloroethane	<2.36 E-05	E
1,2,3-Trimethylbenzene	2.30 E-05	D
1,2,4-Trimethylbenzene	1.43 E-05	C
1,2-Dichloroethane	<2.36 E-05	E
1,2-Dichloropropane	<2.69 E-05	E
1,3,5-Trimethylbenzene	3.38 E-05	D
1,3-Butadiene ^k	2.67E-04	D
1,3-Dichloropropene ^k	<2.64 E-05	E
2-Methylnaphthalene ^k	3.32 E-05	C
2,2,4-Trimethylpentane ^k	2.50 E-04	C
Acenaphthene ^k	1.25 E-06	C

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES
(Continued)

Pollutant	Emission Factor (lb/MMBtu) ^b (fuel input)	Emission Factor Rating
Acenaphthylene ^k	5.53 E-06	C
Acetaldehyde ^{k,l}	8.36 E-03	A
Acrolein ^{k,l}	5.14 E-03	A
Benzene ^k	4.40 E-04	A
Benzo(b)fluoranthene ^k	1.66 E-07	D
Benzo(c)pyrene ^k	4.15 E-07	D
Benzo(g,h,i)perylene ^k	4.14 E-07	D
Biphenyl ^k	2.12 E-04	D
Butane	5.41 E-04	D
Butyr/Isobutyraldehyde	1.01 E-04	C
Carbon Tetrachloride ^k	<3.67 E-05	E
Chlorobenzene ^k	<3.04 E-05	E
Chloroethane	1.87 E-06	D
Chloroform ^k	<2.85 E-05	E
Chrysene ^k	6.93 E-07	C
Cyclopentane	2.27 E-04	C
Ethane	1.05 E-01	C
Ethylbenzene ^k	3.97 E-05	B
Ethylene Dibromide ^k	<4.43 E-05	E
Fluoranthene ^k	1.11 E-06	C
Fluorene ^k	5.67 E-06	C
Formaldehyde ^{k,l}	5.28 E-02	A
Methanol ^k	2.50 E-03	B
Methylcyclohexane	1.23 E-03	C
Methylene Chloride ^k	2.00 E-05	C
n-Hexane ^k	1.11 E-03	C
n-Nonane	1.10 E-04	C

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES
(Continued)

Pollutant	Emission Factor (lb/MMBtu) ^b (fuel input)	Emission Factor Rating
n-Octane	3.51 E-04	C
n-Pentane	2.60 E-03	C
Naphthalene ^k	7.44 E-05	C
PAH ^k	2.69 E-05	D
Phenanthrene ^k	1.04 E-05	D
Phenol ^k	2.40 E-05	D
Propane	4.19 E-02	C
Pyrene ^k	1.36 E-06	C
Styrene ^k	<2.36 E-05	E
Tetrachloroethane ^k	2.48 E-06	D
Toluene ^k	4.08 E-04	B
Vinyl Chloride ^k	1.49 E-05	C
Xylene ^k	1.84 E-04	B

^a Reference 7. Factors represent uncontrolled levels. For NO_x, CO, and PM₁₀, “uncontrolled” means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, “uncontrolled” means no oxidation control; the data set may include units with control techniques used for NO_x control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM-10 = Particulate Matter ≤ 10 microns (μm) aerodynamic diameter. A “<” sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

^b Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10⁶ scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

$$\text{lb/hp-hr} = (\text{lb/MMBtu}) (\text{heat input, MMBtu/hr}) (1/\text{operating HP, 1/hp})$$

^c Emission tests with unreported load conditions were not included in the data set.

^d Based on 99.5% conversion of the fuel carbon to CO₂. CO₂ [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO₂, C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10⁶ scf, and

- h = heating value of natural gas (assume 1020 Btu/scf at 60°F).
- ^e Based on 100% conversion of fuel sulfur to SO₂. Assumes sulfur content in natural gas of 2,000 gr/10⁶ scf.
- ^f Emission factor for TOC is based on measured emission levels from 22 source tests.
- ^g Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor. Measured emission factor for methane compares well with the calculated emission factor, 1.31 lb/MMBtu vs. 1.25 lb/MMBtu, respectively.
- ^h VOC emission factor is based on the sum of the emission factors for all speciated organic compounds less ethane and methane.
- ⁱ Considered $\leq 1 \mu\text{m}$ in aerodynamic diameter. Therefore, for filterable PM emissions, PM₁₀(filterable) = PM_{2.5}(filterable).
- ^j PM Condensable = PM Condensable Inorganic + PM-Condensable Organic
- ^k Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.
- ^l For lean burn engines, aldehyde emissions quantification using CARB 430 may reflect interference with the sampling compounds due to the nitrogen concentration in the stack. The presented emission factor is based on FTIR measurements. Emissions data based on CARB 430 are available in the background report.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO)
FROM NATURAL GAS COMBUSTION^a

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO _x ^b		CO	
	Emission Factor (lb/10 ⁶ scf)	Emission Factor Rating	Emission Factor (lb/10 ⁶ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS) ^c	280	A	84	B
Uncontrolled (Post-NSPS) ^c	190	A	84	B
Controlled - Low NO _x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO _x burners	50	D	84	B
Controlled - Low NO _x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

^a Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from lb/10⁶ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

^b Expressed as NO_x. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_x emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_x emission factor.

^c NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION^a

Pollutant	Emission Factor (lb/10 ⁶ scf)	Emission Factor Rating
CO ₂ ^b	120,000	A
Lead	0.0005	D
N ₂ O (Uncontrolled)	2.2	E
N ₂ O (Controlled-low-NO _x burner)	0.64	E
PM (Total) ^c	7.6	D
PM (Condensable) ^c	5.7	D
PM (Filterable) ^c	1.9	B
SO ₂ ^d	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

^a Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. To convert from lb/10⁶ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds.

VOC = Volatile Organic Compounds.

^b Based on approximately 100% conversion of fuel carbon to CO₂. CO₂[lb/10⁶ scf] = (3.67) (CON) (C)(D), where CON = fractional conversion of fuel carbon to CO₂, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2x10⁴ lb/10⁶ scf.

^c All PM (total, condensable, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM₁₀, PM_{2.5} or PM₁ emissions. Total PM is the sum of the filterable PM and condensable PM. Condensable PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

^d Based on 100% conversion of fuel sulfur to SO₂.

Assumes sulfur content is natural gas of 2,000 grains/10⁶ scf. The SO₂ emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO₂ emission factor by the ratio of the site-specific sulfur content (grains/10⁶ scf) to 2,000 grains/10⁶ scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM
NATURAL GAS COMBUSTION^a

CAS No.	Pollutant	Emission Factor (lb/10 ⁶ scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene ^{b, c}	2.4E-05	D
56-49-5	3-Methylchloranthrene ^{b, c}	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene ^{b, c}	<1.6E-05	E
83-32-9	Acenaphthene ^{b, c}	<1.8E-06	E
203-96-8	Acenaphthylene ^{b, c}	<1.8E-06	E
120-12-7	Anthracene ^{b, c}	<2.4E-06	E
56-55-3	Benz(a)anthracene ^{b, c}	<1.8E-06	E
71-43-2	Benzene ^b	2.1E-03	B
50-32-8	Benzo(a)pyrene ^{b, c}	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene ^{b, c}	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene ^{b, c}	<1.2E-06	E
205-82-3	Benzo(k)fluoranthene ^{b, c}	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene ^{b, c}	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene ^{b, c}	<1.2E-06	E
25321-22-6	Dichlorobenzene ^b	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene ^{b, c}	3.0E-06	E
86-73-7	Fluorene ^{b, c}	2.8E-06	E
50-00-0	Formaldehyde ^b	7.5E-02	B
110-54-3	Hexane ^b	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene ^{b, c}	<1.8E-06	E
91-20-3	Naphthalene ^b	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene ^{b, c}	1.7E-05	D

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM
NATURAL GAS COMBUSTION (Continued)

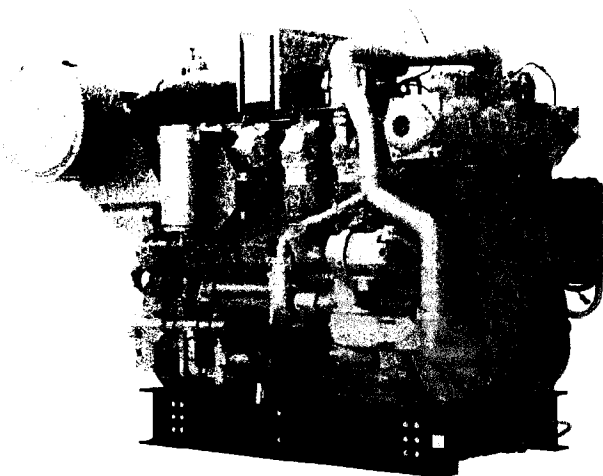
CAS No.	Pollutant	Emission Factor (lb/10 ⁶ scf)	Emission Factor Rating
74-98-6	Propane	1.6E+00	E
129-00-0	Pyrene ^{b, c}	5.0E-06	E
108-88-3	Toluene ^b	3.4E-03	C

^a Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. To convert from lb/10⁶ scf to lb/MMBtu, divide by 1,020. Emission Factors preceded with a less-than symbol are based on method detection limits.

^b Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

^c HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

^d The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.



Shown with Optional
Equipment

CAT® ENGINE SPECIFICATIONS

V-8, 4-Stroke-Cycle

Bore	170 mm (6.7 in.)
Stroke	190 mm (7.5 in.)
Displacement	34.5 L (2105 cu. in.)
Aspiration	Turbocharged-Aftercooled
Digital Engine Management	
Governor and Protection	Electronic (ADEM™ A3)
Combustion	Low Emission (Lean Burn)
Engine Weight, net dry (approx)	5420 kg (11,950 lb)
Power Density	10.9 kg/kW (17.8 lb/bhp)
Power per Displacement	19.4 bhp/L
Total Cooling System Capacity	124.9 L (33 gal)
Jacket Water	113.6 L (30 gal)
SCAC	11.4 L (3 gal)
Lube Oil System (refill)	230.9 L (61 gal)
Oil Change Interval	1000 hours
Rotation (from flywheel end)	Counterclockwise
Flywheel and Flywheel Housing	SAE No. 00
Flywheel Teeth	183

FEATURES

Engine Design

- Proven reliability and durability
- Ability to burn a wide spectrum of gaseous fuels
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Broad operating speed range

Emissions

Meets U.S. EPA Spark Ignited Stationary NSPS Emissions for 2007/8

Advanced Digital Engine Management

ADEM A3 control system providing integrated ignition, speed governing, protection, and controls, including detonation-sensitive variable ignition timing. ADEM A3 has improved: user interface, display system, shutdown controls, and system diagnostics.

Lean Burn Engine Technology

Lean-burn engines operate with large amounts of excess air. The excess air absorbs heat during combustion reducing the combustion temperature and pressure, greatly reducing levels of NOx. Lean-burn design also provides longer component life and excellent fuel consumption.

Ease of Operation

Side covers on block allow for inspection of internal components

Full Range of Attachments

Large variety of factory-installed engine attachments reduces packaging time

Testing

Every engine is full-load tested to ensure proper engine performance.

Gas Engine Rating Pro

GERP is a PC-based program designed to provide site performance capabilities for Cat® natural gas engines for the gas compression industry. GERP provides engine data for your site's altitude, ambient temperature, fuel, engine coolant heat rejection, performance data, installation drawings, spec sheets, and pump curves.

Product Support Offered Through Global Cat Dealer Network

More than 2,200 dealer outlets

Cat factory-trained dealer technicians service every aspect of your petroleum engine

Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S-O-SSM program matches your oil and coolant samples against Caterpillar set standards to determine:

- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

Over 80 Years of Engine Manufacturing Experience

Over 60 years of natural gas engine production

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products.

- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

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STANDARD EQUIPMENT

Air Inlet System

Remote air inlet adapters

Charging System

Battery chargers

Cooling System

Jacket water thermostats and housing — full open temperature 98°C (208°F)

Jacket water pump — gear driven, centrifugal, non-self-priming

Aftercooler water pump — gear driven, centrifugal, non-self-priming

Aftercooler core for sea-air atmosphere

Aftercooler thermostats and housing — full open temperature 35°C (95°F)

Aftercooler — raw water, cleanable

Exhaust System

Exhaust manifolds — watercooled

Flywheels & Flywheel Housings

SAE No. 00 flywheel

SAE No. 00 flywheel housing

SAE standard rotation

Fuel System

Gas pressure regulator

Natural gas carburetor

Fuel gas shut-off valve (24V DC)

Instrumentation

Advisor panel

Advisor interconnect harness

Lubrication System

Crankcase breathers — top mounted

Oil cooler

Oil filter — RH

Oil pan — shallow

Oil sampling valve

Turbo oil accumulator

Mounting System

Rails, engine mounting

Power Take-Offs

Front housing — two-sided

Front lower LH accessory drive

Protection System

Electronic shutoff system

Gas shutoff valve

General

Paint — Cat yellow

Vibration damper and guard

OPTIONAL EQUIPMENT

Air Inlet System

Remote air inlet adapters

Charging System

Battery chargers

Cooling System

Aftercooler core

Thermostatic valves

Connections

Expansion and overflow tank

Water level switch gauge

European Certifications

European Union certifications

Exhaust System

Flexible fittings

Elbows

Flanges

Flange and exhaust expanders

Mufflers

Fuel System

Fuel filter

Instrumentation

Customer communication modules

Lubrication System

Oil filters — duplex

Oil pan drain

Oil level regulator

Sump pumps

Lubricating oil

Mounting System

Rails

Vibration isolators

Power Take-Offs

Auxiliary drive shaft

Auxiliary drive pulleys

Front stub shaft

Pulleys

Protection System

Gas valve

Explosion relief valves

Starting System

Air pressure regulator

Air silencer

JW heaters

Battery sets (24-volt dry)

Battery accessories

General

Flywheel guard removal

Engine barring group

Premium 8:1 pistons

TECHNICAL DATA
G3508 LE Gas Petroleum Engine — 1400 rpm

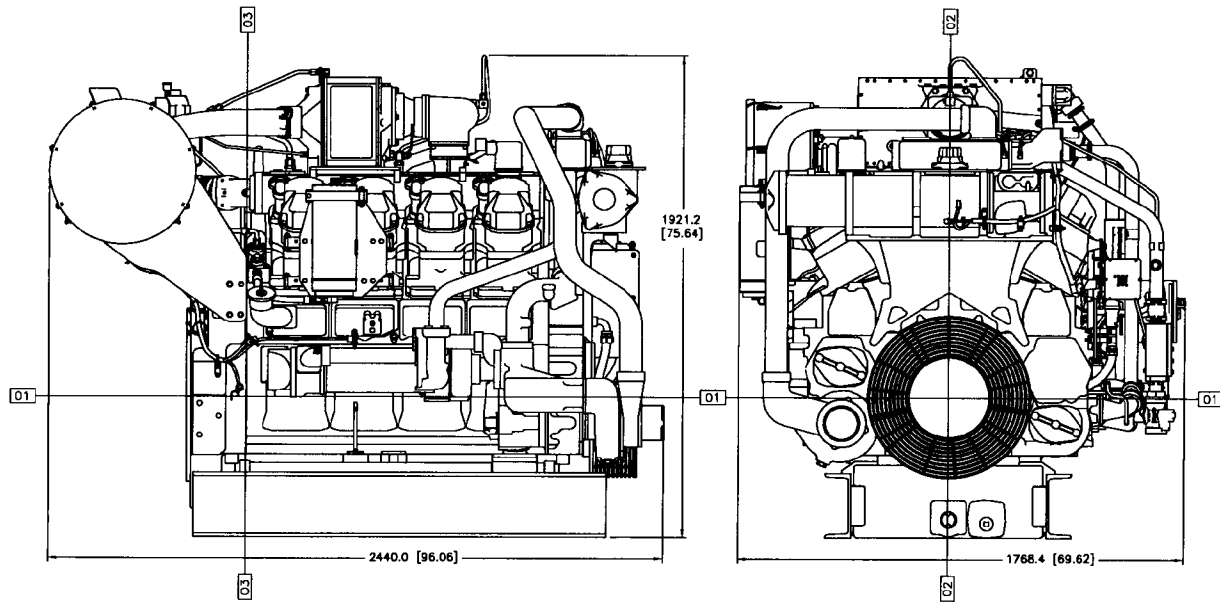
		2 g NOx NTE Rating DM8621-2
Engine Power		
@ 100% Load	bkW (bhp)	500 (670)
@ 75% Load	bkW (bhp)	375 (502)
Engine Speed		
Max Altitude @ Rated Torque and 38°C (100°F)	rpm m (ft)	1400 609.6 (2000)
Speed Turndown @ Max Altitude, Rated Torque, and 38°C (100°F)	%	25
SCAC Temperature	°C (°F)	54 (130)
Emissions*		
NOx	g/bkW-hr (g/bhp-hr)	2.68 (2)
CO	g/bkW-hr (g/bhp-hr)	2.47 (1.84)
CO ₂	g/bkW-hr (g/bhp-hr)	627 (468)
VOC**	g/bkW-hr (g/bhp-hr)	0.41 (0.3)
Fuel Consumption***		
@ 100% Load	MJ/bkW-hr (Btu/bhp-hr)	10.63 (7510)
@ 75% Load	MJ/bkW-hr (Btu/bhp-hr)	11.22 (7936)
Heat Balance		
Heat Rejection to Jacket Water		
@ 100% Load	bkW (Btu/min)	319.8 (18,204)
@ 75% Load	bkW (Btu/min)	282 (16,013)
Heat Rejection to Aftercooler		
@ 100% Load	bkW (Btu/min)	80 (4555)
@ 75% Load	bkW (Btu/min)	56.1 (3191)
Heat Rejection to Exhaust		
@ 100% Load (LHV to 77° F / 25° C)	bkW (Btu/mn)	481.9 (27,406)
@ 75% Load (LHV to 77°) (LHV to 77° F / 25° C)	bkW (Btu/mn)	372.8 (21,203)
Exhaust System		
Exhaust Gas Flow Rate (@ stack temp., 14.5 psig)		
@ 100% Load	m ³ /min (cfm)	115.7 (4086)
@ 75% Load	m ³ /min (cfm)	89.57 (3163)
Exhaust Stack Temperature		
@ 100% Load	°C (°F)	529 (985)
@ 75% Load	°C (°F)	525 (977)
Intake System		
Air Inlet Flow Rate		
@ 100% Load	m ³ /min (scfm)	39.53 (1396)
@ 75% Load	m ³ /min (scfm)	30.72 (1085)
Gas Pressure	kPag (psig)	242-276 (35-40)

*at 100% load and speed, all values are listed as not to exceed

**Volatile organic compounds as defined in U.S. EPA 40 CFR 60, subpart JJJJ

***ISO 3046/1

GAS PETROLEUM ENGINE



DIMENSIONS		
Length	mm (in)	2440.0 (96.06)
Width	mm (in)	1768.4 (69.62)
Height	mm (in)	1921.2 (75.64)
Shipping Weight	kg (lb)	5420 (11,950)

Note: General configuration not to be used for installation. See general dimension drawings for detail (drawing #315-3136).

Dimensions are in mm (inches).

RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

Conditions: Power for gas engines is based on fuel having an LHV of 33.74 kJ/L (905 Btu/cu ft) at 101 kPa (29.91 in. Hg) and 15° C (59° F). Fuel rate is based on a cubic meter at 100 kPa (29.61 in. Hg) and 15.6° C (60.1° F). Air flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and 25° C (77° F). Exhaust flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and stack temperature.

Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication. CAT, CATERPILLAR, their respective logos, ADEM, S-O-S, "Caterpillar Yellow" and the "Power Edge" trade dress, as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.

Performance Number: DM8621-02
LEHW0034-01 (2-10)

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G3508 LE

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED (rpm): 1400
COMPRESSION RATIO: 8:1
AFTERCOOLER WATER INLET (°F): 130
JACKET WATER OUTLET (°F): 210
COOLING SYSTEM: JW+OC , AC
IGNITION SYSTEM: ADEM3
EXHAUST MANIFOLD: ASWC
COMBUSTION: Low Emission
NOx EMISSION LEVEL (g/bhp-hr NOx): 2.0
SET POINT TIMING: 25.4

FUEL SYSTEM: HPG IMPCO
SITE CONDITIONS:
FUEL: Field Gas
FUEL PRESSURE RANGE (psig): 35.0-40.0
FUEL METHANE NUMBER: 62.2
FUEL LHV (Btu/scf): 1027
ALTITUDE(ft): 500
MAXIMUM INLET AIR TEMPERATURE(°F): 100
NAMEPLATE RATING: 630 bhp@1400rpm

RATING	NOTES	LOAD	MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
			100%	100%	75%	50%
ENGINE POWER	(1)	bhp	630	627	471	315
INLET AIR TEMPERATURE		°F	98	100	100	100

ENGINE DATA						
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	7820	7828	8156	9047
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	8641	8650	9012	9997
AIR FLOW	(3)	lb/hr	5817	5798	4462	3135
AIR FLOW WET (77°F, 14.7 psia)	(3)	scfm	1312	1308	1006	707
INLET MANIFOLD PRESSURE	(4)	in Hg(abs)	64.1	63.9	49.5	36.3
EXHAUST STACK TEMPERATURE	(5)	°F	856	856	851	839
EXHAUST GAS FLOW (@ stack temp, 14.5 psia)	(6)	ft3/min	3485	3473	2666	1863
EXHAUST GAS MASS FLOW	(6)	lb/hr	6054	6034	4647	3272

EMISSIONS DATA						
NOx (as NO2)	(7)	g/bhp-hr	2.00	2.00	2.51	3.04
CO	(7)	g/bhp-hr	2.04	2.04	2.17	2.18
THC (molecular wt. of 15.84)	(7)	g/bhp-hr	2.38	2.38	2.41	2.44
NMHC (molecular wt. of 15.84)	(7)	g/bhp-hr	0.62	0.62	0.62	0.63
NMNEHC (molecular wt. of 15.84)	(7)	g/bhp-hr	0.41	0.42	0.42	0.43
HCHO (Formaldehyde)	(7)	g/bhp-hr	0.28	0.28	0.28	0.31
CO2	(7)	g/bhp-hr	543	544	566	628
EXHAUST OXYGEN	(8)	% DRY	7.4	7.4	7.1	6.6

HEAT REJECTION						
HEAT REJ. TO JACKET WATER	(9)	Btu/min	22941	22915	19677	17225
HEAT REJ. TO ATMOSPHERE	(9)	Btu/min	3188	3179	2650	2126
HEAT REJ. TO LUBE OIL	(9)	Btu/min	3421	3417	2935	2569
HEAT REJ. TO AFTERCOOLER	(9)(10)	Btu/min	4684	4762	2492	766

HEAT EXCHANGER SIZING CRITERIA			
HEAT REJ. TO JACKET WATER/LUBE OIL CIRCUIT	(10)	Btu/min	29341
HEAT REJ. TO AFTERCOOLER	(10)(11)	Btu/min	5000
A cooling system safety factor of 0% has been added to the heat exchanger sizing criteria.			

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature.

100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature.

Max. rating is the maximum capability for the specified fuel at site altitude and reduced inlet air temperature.

Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

PREPARED BY:

Data generated by Gas Engine Rating Pro Version 3.00.00

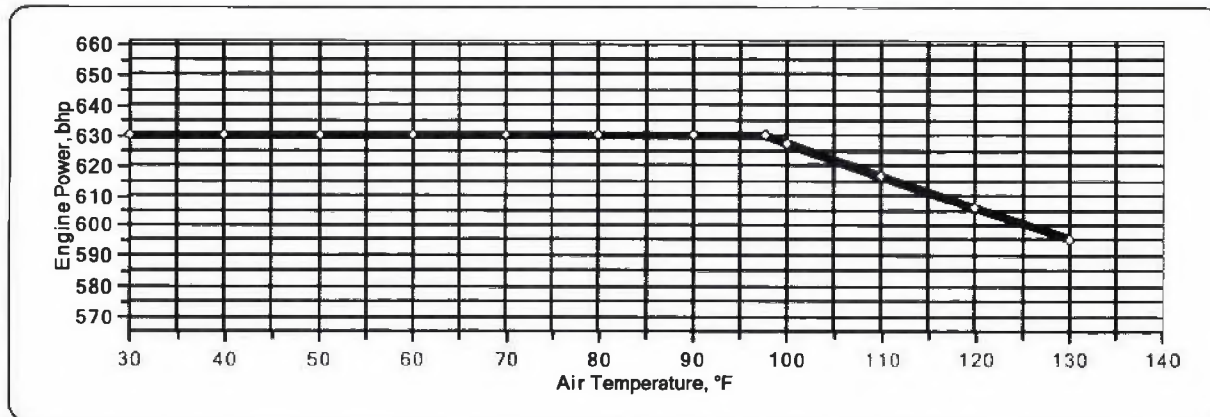
Ref. Data Set DM8585-00-003, Printed 26Feb2008

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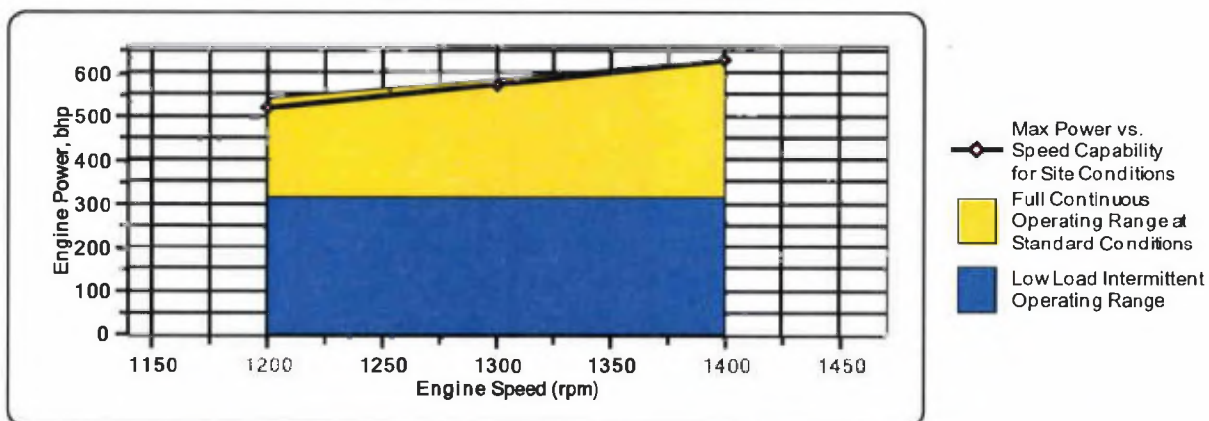
Page 1 of 4

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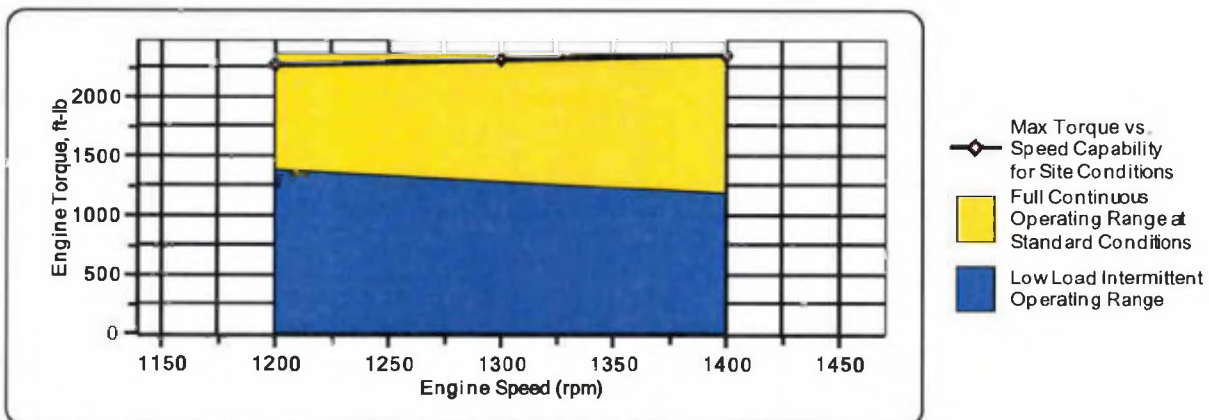
Engine Power vs. Inlet Air Temperature



Engine Power vs. Engine Speed



Engine Torque vs. Engine Speed



NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is $\pm 3\%$ of full load.
2. Fuel consumption tolerance is $\pm 3.0\%$ of full load data.
3. Undried air. Flow is a nominal value with a tolerance of $\pm 5\%$.
4. Inlet manifold pressure is a nominal value with a tolerance of $\pm 5\%$.
5. Exhaust stack temperature is a nominal value with a tolerance of $(+)63^{\circ}\text{F}$, $(-)54^{\circ}\text{F}$.
6. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of $\pm 6\%$.
7. Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions, adjusted to the specified NOx level at 100% load. Fuel methane number cannot vary more than ± 3 . NOx values are set points and will vary with operating conditions. All other emission values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "not to exceed" values. Part load data may require engine adjustment.
8. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5 .
9. Heat rejection values are nominal. Tolerances, based on treated water, are $\pm 10\%$ for jacket water circuit, $\pm 50\%$ for radiation, $\pm 20\%$ for lube oil circuit, and $\pm 5\%$ for aftercooler circuit.
10. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.
11. Heat exchanger sizing criteria are maximum heat rejection for the site, with applied tolerances.

G3508 LE

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	2.5211	2.5211
Methane	CH4	86.6340	86.6340
Ethane	C2H6	4.9767	4.9767
Propane	C3H8	3.5670	3.5670
Isobutane	iso-C4H10	0.0000	0.0000
Norbutane	nor-C4H10	1.8211	1.8211
Isopentane	iso-C5H12	0.0000	0.0000
Norpentane	nor-C5H12	0.4802	0.4802
Hexane	C6H14	0.0000	0.0000
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.0000	0.0000
Carbon Dioxide	CO2	0.0000	0.0000
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup:

Field Gas

Unit of Measure:

English

Calculated Fuel Properties

Caterpillar Methane Number: 62.2

Lower Heating Value (Btu/scf): 1027

Higher Heating Value (Btu/scf): 1135

WOBBE Index (Btu/scf): 1274

RPC (%) (To 905 Btu/scf Fuel): 100%

Compressibility Factor: 0.997

Stoich A/F Ratio (Vol/Vol): 10.68

Stoich A/F Ratio (Mass/Mass): 16.43

Specific Gravity (Relative to Air): 0.650

Specific Heat Constant (K): 1.297

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

PREPARED BY:

Data generated by Gas Engine Rating Pro Version 3.00.00

Ref. Data Set DM8585-00-003, Printed 26Feb2008

SITE DATA
OIL & GAS STANDARD PERMIT REGISTRATION
SUGARKANE CTB - BAKER DEHY UNIT
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Representative Analyses:
Etheridge B1
and Laird B1

Stream Compositions:

Component	Stream 1		Stream 2		Stream 3		Stream 4	
	Inlet Gas		Flare Assist Gas		LP Condensate		Produced Water	
	mole %	wgt. %	mole %	wgt. %	mole %	wgt. %	mole %	wgt %
Nitrogen	0.254%	0.301%	0.164%	0.202%	0.048%	0.012%	0.000%	0.000%
Carbon Dioxide	2.372%	4.419%	2.163%	4.184%	0.125%	0.049%	0.001%	0.002%
Water	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	99.000%	94.121%
Hydrogen Sulfide	0.015%	0.022%	0.015%	0.022%	0.000%	0.000%	0.000%	0.000%
Methane	70.652%	47.978%	75.685%	53.363%	2.101%	0.302%	0.021%	0.018%
Ethane	14.029%	17.856%	11.765%	15.548%	2.081%	0.561%	0.021%	0.033%
Propane	6.979%	13.027%	4.689%	9.087%	3.619%	1.431%	0.036%	0.084%
I-Butane	1.061%	2.610%	0.899%	2.296%	1.260%	0.657%	0.013%	0.040%
N-Butane	2.235%	5.499%	1.663%	4.248%	3.992%	2.081%	0.040%	0.123%
I-Pentane	0.661%	2.019%	0.652%	2.067%	2.779%	1.798%	0.028%	0.107%
N-Pentane	0.665%	2.031%	0.623%	1.975%	3.830%	2.478%	0.038%	0.145%
Cyclopentane	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
n-Hexane	0.218%	0.795%	0.279%	1.057%	3.069%	2.372%	0.031%	0.141%
Cyclohexane	0.088%	0.321%	0.137%	0.519%	1.076%	0.831%	0.011%	0.050%
Other Hexanes	0.401%	1.463%	0.517%	1.958%	4.278%	3.306%	0.043%	0.196%
Heptanes	0.193%	0.819%	0.347%	1.528%	7.783%	6.993%	0.078%	0.412%
Octanes	0.044%	0.213%	0.109%	0.547%	6.618%	6.779%	0.066%	0.398%
Nonanes	0.025%	0.136%	0.058%	0.327%	5.967%	6.863%	0.060%	0.406%
Decanes Plus	0.007%	0.042%	0.014%	0.088%	46.045%	58.753%	0.460%	3.454%
Benzene	0.027%	0.089%	0.034%	0.117%	0.426%	0.298%	0.004%	0.016%
Toluene	0.062%	0.242%	0.132%	0.534%	1.824%	1.507%	0.018%	0.087%
Ethylbenzene	0.004%	0.018%	0.006%	0.028%	0.443%	0.422%	0.004%	0.022%
Xylene	0.023%	0.103%	0.065%	0.303%	2.634%	2.508%	0.026%	0.146%
Totals	100.02%	100.00%	100.02%	100.00%	99.998%	100.00%	99.999%	100.00%
Totals (C3+)		29.43%		26.68%		99.08%		5.83%
VOC max (%)		30.00%		30.00%		100.00%		10.00%
Benzene Max (%)		0.13%		0.18%		0.45%		0.02%
Higher Heating Value (Btu/scf)	1358		1315					
Lower Heating Value (Btu/scf)	1335		1292					
Specific Gravity	0.8185				0.7873			

NOTE: the Gas Analyses used for the Site as a representative analysis was chosen because of its proximity, shale location, and production characteristics. Due to these similarities it is anticipated the samples will be representative to the Site. Because these sites are still being constructed and wells have yet to be drilled, Burlington Resources is using the best available representative data in that area at this time. Burlington is pro-actively sampling sites in that area and each application reflects the most representative sample available. Additionally, H2S representations are also from nearby representative data, as shown in Figure 6-1. Please note that this is in an effort to comply with the TCEQ guidance on representative samples in the most conservative manner possible. This approach has been discussed and previously approved with multiple TCEQ reviewers.



LABORATORY REFERENCE NUMBER : 6889-250891

Conoco Phillips

ID: **Etheridge B1**
 AREA: **Eagleford**
 METER: **Low Pressure Separator**
 LEASE:
 OPERATOR:
 STATION:
 SAMPLE DATE: **12/20/2011**
 SAMPLE OF: **Gas**

LINE PRESSURE: **81 PSI**
 LINE TEMPERATURE: **84 F**
 CYLINDER NUMBER: **0036**
 EFFECTIVE DATE:
 SAMPLED BY: **Robert Hester**
 ANALYZED BY: **Kerry Quave**
 ANALYZED DATE: **12/24/2011**
 SAMPLE TYPE: **Spot**

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Physical Properties per GPA 2145-09

Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
NITROGEN	0.254	0.301	
CARBON DIOXIDE	2.372	4.421	
METHANE	70.652	47.999	
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
HEXANES	0.566	2.065	0.234
HEPTANES PLUS	0.526	2.152	0.213
	<u>100.000</u>	<u>100.000</u>	<u>7.669</u>

BTU	Vol. IDEAL	Vol. Real
	Gas Fuel	Gas Fuel
BTU @ 14.696 PSIA (DRY)	1351.7	1357.6
BTU @ 14.696 PSIA (SAT.)	1328.1	1334.5
Specific Gravity	0.8153	0.8185
Compressibility (Z)	0.9957	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	7.456
Propane & Heavier	3.697
Butane & Heavier	1.771
Pentane & Heavier	0.717
Total 26 psi Reid V.P. Gasoline GPM	1.391

Secondary BTU Psia Base

	Vol. IDEAL	Vol. Real
	Gas Fuel	Gas Fuel
BTU @ 15.025 PSIA (DRY)	1381.9	1388.1
BTU @ 15.025 PSIA (SAT.)	1357.8	1364.5
Compressibility (Z) at 15.025 =	0.9956	

Remarks:**Remarks:**

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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LABORATORY REFERENCE NUMBER : 6889-250891

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #####

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
NITROGEN	0.254	0.301	0.028
CARBON DIOXIDE	2.372	4.421	0.406
METHANE	70.652	47.999	11.999
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
2,2-Dimethylbutane	0.013	0.047	0.005
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.206	0.752	0.086
3-Methylpentane	0.129	0.470	0.053
n-Hexane	0.218	0.796	0.090
2,2-Dimethylpentane	0.004	0.017	0.002
Methylcyclopentane	0.053	0.189	0.019
2,4-Dimethylpentane	0.000	0.000	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.027	0.089	0.008
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.088	0.314	0.030
2-Methylhexane	0.008	0.034	0.004
2,3-Dimethylpentane	0.039	0.166	0.018
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.007	0.030	0.003
1,t-3-Dimethylcyclopentane	0.004	0.017	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.006	0.025	0.002
1,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.073	0.310	0.034
Methylcyclohexane	0.051	0.212	0.021
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.001	0.005	0.000
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.002	0.010	0.001
Ethylcyclopentane	0.001	0.004	0.000
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3-Dimethylhexane	0.000	0.000	0.000
Toluene	0.062	0.242	0.021
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.012	0.058	0.006
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.001	0.005	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

6-27



LABORATORY REFERENCE NUMBER : 6889-250891

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #####

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
1,t-4-Dimethylcyclohexane & 1,c2,13- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.008	0.038	0.004
n-Octane	0.024	0.116	0.012
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.002	0.010	0.001
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.001	0.005	0.000
Isopropylcyclopentane	0.001	0.005	0.000
Dimethylheptanes & Trimethylhexanes	0.003	0.016	0.002
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.002	0.011	0.001
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.004	0.018	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.007	0.031	0.003
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.001	0.005	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.016	0.072	0.006
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.007	0.038	0.004
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
Isopropylcyclohexane	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.001	0.005	0.000
N-Propylcyclohexane	0.001	0.005	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.001	0.006	0.001
n-Propylbenzene	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyltoluene	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.002	0.012	0.001
	<u>100.000</u>	<u>100.000</u>	<u>20.102</u>

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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LABORATORY REFERENCE NUMBER : 6889-250891

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #####

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	23.613	96.508
Relative Density	0.3730	0.7611
Liquid Density (lbs/gal Absolute Density)	3.110	6.345
Liquid Density (lbs/gal Weight in Air)	3.107	6.339
Cu.Ft./Vapor / Gal. @ 14.696	49.981	24.949
Vapor Pressure @ 100° F	3660.220	0.980
API Gravity at 60° F	247.9	54.4
BTU / LB	21723	10231
BTU / GAL.	67539	60392
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1351.7	5098.4
Specific Gravity as a Vapor @ 14.696	0.8153	1.6056

Heavy End Grouping Breakdown

HEXANES	C6	0.566
HEPTANES	C7	0.309
OCTANES	C8	0.162
NONANES	C9	0.046
DECANES+	C10	0.009
Total		1.092 Mol%

BTEX BREAKDOWN

	Mol%	WT. %
BENZENE	0.027	0.089
TOLUENE	0.062	0.242
ETHYLBENZENE	0.004	0.018
XYLENES	0.023	0.103
Total BTEX	0.116	0.452

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

6-29



LABORATORY REFERENCE NUMBER : 6889-250891

Conoco Phillips

ID: **Etheridge B1**
 AREA: **Eagleford**
 METER: **Low Pressure Separator**
 LEASE:
 OPERATOR:
 STATION:
 SAMPLE DATE: **12/20/2011**
 SAMPLE OF: **Gas**

LINE PRESSURE: **81 PSI**
 LINE TEMPERATURE: **84 F**
 CYLINDER NUMBER: **0036**
 EFFECTIVE DATE:
 SAMPLED BY: **Robert Hester**
 ANALYZED BY: **Kerry Quave**
 ANALYZED DATE: **12/24/2011**
 SAMPLE TYPE: **Spot**

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Physical Properties per GPA 2145-09

Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
NITROGEN	0.254	0.301	
CARBON DIOXIDE	2.372	4.421	
METHANE	70.652	47.999	
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
HEXANE	0.566	2.065	0.234
HEPTANE	0.309	1.191	0.122
OCTANE	0.162	0.690	0.066
NONANE	0.046	0.222	0.021
DECANE+	0.009	0.049	0.004
	<u>100.000</u>	<u>100.000</u>	<u>7.669</u>

BTU	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1351.7	1357.6
BTU @ 14.696 PSIA (SAT.)	1328.1	1334.5
Specific Gravity	0.8153	0.8185
Compressibility (Z)	0.9957	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	7.456
Propane & Heavier	3.697
Butane & Heavier	1.771
Pentane & Heavier	0.717
Total 26 psi Reid V.P. Gasoline GPM	1.391

Secondary BTU Psia Base

	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1381.9	1388.1
BTU @ 15.025 PSIA (SAT.)	1357.8	1364.5

Compressibility (Z) at 15.025 = 0.9956

Remarks:

Precision parameters apply to the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford

Sample Container	Sample Description	Sample Point	Sample Time	Sample Matrix	RVP by D5191	Sample Pressure, psi	Sample Temp, F
Cylinder Type/No. or Bottle	Field/Locations/Well		Date, hours				
Station 74139 (10)	Etheridge B1	LP Separator before Dump Valve	12/20/2011 @ 11:00 AM	Condensate	9.85 psi	84	85

Chromatographic Extended Analysis - Summation Report			
Component	Mol%	Liq Vol%	Wt%
Nitrogen	0.048	0.008	0.008
Carbon Dioxide	0.125	0.032	0.033
Methane	2.101	0.536	0.204
Ethane	2.081	0.838	0.379
Propane	3.619	1.501	0.967
Isobutane	1.260	0.621	0.444
n-Butane	3.992	1.895	1.406
2,2 Dimethylpropane	0.021	0.012	0.009
Isopentane	2.779	1.530	1.215
n-Pentane	3.809	2.079	1.666
2,2 Dimethylbutane	0.069	0.043	0.036
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.181	0.153
2 Methylpentane	1.842	1.151	0.962
3 Methylpentane	1.088	0.669	0.568
n-Hexane	3.069	1.900	1.603
Heptanes Plus	73.804	87.004	90.346
Total	100.000	100.000	100.000

Characteristics of Heptanes Plus
Specific Gravity 0.8175 (Water = 1)
API Gravity 41.59 @60 F
Molecular Weight 202.0
Vapor Volume 12.85 CF/Gal
Weight 6.81 Lbs/Gal

Characteristics of Total Sample
Specific Gravity 0.7873 (Water = 1)
API Gravity 48.24 @60 F
Molecular Weight 165.0
Vapor Volume 15.14 CF/Gal
Weight 6.56 Lbs/Gal

Total Extended Report			
Component	Mol%	Liq Vol%	Wt%
Nitrogen	0.048	0.008	0.008
Carbon Dioxide	0.125	0.032	0.033
Methane	2.101	0.536	0.204
Ethane	2.081	0.838	0.379
Propane	3.619	1.501	0.967
Isobutane	1.260	0.621	0.444
n-Butane	3.992	1.895	1.406
2,2 Dimethylpropane	0.021	0.012	0.009
Isopentane	2.779	1.530	1.215
n-Pentane	3.809	2.079	1.666
2,2 Dimethylbutane	0.069	0.043	0.036
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.181	0.153
2 Methylpentane	1.842	1.151	0.962
3 Methylpentane	1.088	0.669	0.568
n-Hexane	3.069	1.900	1.603
Methylcyclopentane	0.986	0.526	0.503
Benzene	0.426	0.180	0.202
Cyclohexane	1.076	0.551	0.549
2-Methylhexane	1.284	0.899	0.780
3-Methylhexane	1.053	0.728	0.640
2,2,4 Trimethylpentane	0.000	0.000	0.000
Dther C-7's	0.801	0.541	0.482
n-Heptane	2.776	1.928	1.686
Methylcyclohexane	1.869	1.131	1.112
Toluene	1.824	0.920	1.018
Dther C-8's	4.248	3.068	2.837
n-Octane	2.370	1.828	1.841
E-Benzene	0.443	0.258	0.285
M & P Xylenes	1.938	1.132	1.247
O-Xylene	0.696	0.398	0.448
Dther C-9's	3.963	3.218	3.032
n-Nonane	2.004	1.698	1.557
Dther C-10's	5.024	4.483	4.301
n-Decane	1.515	1.400	1.306
Undecanes (11)	5.324	4.674	4.743
Dodecanes (12)	4.010	3.965	3.912
Tridecanes (13)	3.769	3.996	3.997
Tetradecanes (14)	3.226	3.663	3.714
Pentadecanes (15)	2.694	3.276	3.363
Hexadecanes (16)	2.180	2.835	2.934
Heptadecanes (17)	1.927	2.649	2.767
Octadecanes (18)	1.724	2.495	2.622
Nonadecanes (19)	1.600	2.413	2.551
Eicosanes (20)	1.271	1.992	2.118
Henicosanes (21)	1.058	1.745	1.866
Docosanes (22)	0.967	1.662	1.788
Tricosanes (23)	0.757	1.349	1.459
Tetracosanes (24)	0.692	1.278	1.389
Pentacosanes (25)	0.617	1.182	1.290
Hexacosanes (26)	0.452	0.658	0.984
Heptacosanes (27)	0.433	1.015	1.118
Octacosanes (28)	0.424	0.903	0.998
Nonacosanes (29)	0.360	0.791	0.877
triacontanes (30)	0.274	0.622	0.692
Henitricontanes Plus (31+)	5.687	18.494	21.541
Total	100.000	100.000	100.000



LABORATORY REFERENCE NUMBER : 6894-250891

Conoco Phillips

ID: **Laird B1**
 AREA: **Eagleford**
 METER: **High Pressure Separator**
 LEASE:
 OPERATOR:
 STATION:
 SAMPLE DATE: **12/20/2011**
 SAMPLE OF: **Gas**

LINE PRESSURE: **1060 PSI**
 LINE TEMPERATURE: **112 F**
 CYLINDER NUMBER: **0110**
 EFFECTIVE DATE:
 SAMPLED BY: **Robert Hester**
 ANALYZED BY: **Kerry Quave**
 ANALYZED DATE: **12/24/2011**
 SAMPLE TYPE: **Spot**

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Physical Properties per GPA 2145-09

Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
NITROGEN	0.164	0.202	
CARBON DIOXIDE	2.163	4.187	
METHANE	75.685	53.403	
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
HEXANES	0.733	2.778	0.302
HEPTANES PLUS	0.964	4.182	0.396
	<u>100.000</u>	<u>100.000</u>	<u>6.428</u>

BTU	Vol. IDEAL	Vol. Real
	Gas Fuel	Gas Fuel
BTU @ 14.696 PSIA (DRY)	1310.2	1315.3
BTU @ 14.696 PSIA (SAT.)	1287.3	1292.9
Specific Gravity	0.7850	0.7878
Compressibility (Z)	0.9961	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	6.032
Propane & Heavier	2.881
Butane & Heavier	1.587
Pentane & Heavier	0.767
Total 26 psi Reid V.P. Gasoline GPM	1.791

Secondary BTU Psia Base

	Vol. IDEAL	Vol. Real
	Gas Fuel	Gas Fuel
BTU @ 15.025 PSIA (DRY)	1339.5	1344.8
BTU @ 15.025 PSIA (SAT.)	1316.1	1321.9
Compressibility (Z) at 15.025 =	0.9960	

Remarks:

Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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LABORATORY REFERENCE NUMBER : 6894-250891

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #####

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
NITROGEN	0.164	0.202	0.018
CARBON DIOXIDE	2.163	4.187	0.370
METHANE	75.685	53.403	12.848
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
2,2-Dimethylbutane	0.025	0.093	0.010
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.248	0.940	0.103
3-Methylpentane	0.182	0.688	0.074
n-Hexane	0.279	1.057	0.115
2,2-Dimethylpentane	0.009	0.040	0.004
Methylcyclopentane	0.062	0.229	0.022
2,4-Dimethylpentane	0.001	0.004	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.034	0.117	0.010
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.137	0.507	0.047
2-Methylhexane	0.012	0.053	0.006
2,3-Dimethylpentane	0.071	0.313	0.032
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.010	0.044	0.005
1,t-3-Dimethylcyclopentane	0.006	0.026	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.009	0.039	0.004
1,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.135	0.595	0.062
Methylcyclohexane	0.092	0.397	0.037
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.003	0.015	0.001
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.005	0.025	0.003
Ethylcyclopentane	0.002	0.009	0.001
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3-Dimethylhexane	0.000	0.000	0.000
Toluene	0.132	0.535	0.044
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.033	0.166	0.017
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.002	0.010	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

6-33



LABORATORY REFERENCE NUMBER : 6894-250891

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #####

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
1,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.017	0.084	0.008
n-Octane	0.057	0.286	0.029
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.004	0.020	0.002
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.002	0.010	0.001
Isopropylcyclopentane	0.003	0.015	0.001
Dimethylheptanes & Trimethylhexanes	0.006	0.033	0.003
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.007	0.039	0.004
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.006	0.028	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.019	0.089	0.007
2 & 4 Methylcyclohexane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methylcyclohexane	0.002	0.011	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.046	0.215	0.018
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.020	0.113	0.011
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.001	0.006	0.001
Isopropylcyclohexane	0.002	0.011	0.001
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.002	0.010	0.001
N-Propylcyclohexane	0.001	0.006	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.003	0.019	0.002
n-Propylbenzene	0.003	0.016	0.001
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethylcyclohexane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.004	0.025	0.002
	<u>100.000</u>	<u>100.000</u>	<u>19.664</u>

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-87/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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LABORATORY REFERENCE NUMBER : 6894-250891

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #####

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	22.736	98.624
Relative Density	0.3670	0.7618
Liquid Density (lbs/gal Absolute Density)	3.060	6.351
Liquid Density (lbs/gal Weight in Air)	3.057	6.345
Cu.Ft./Vapor / Gal. @ 14.696	51.074	24.437
Vapor Pressure @ 100° F	3889.010	1.010
API Gravity at 60° F	254.1	54.2
BTU / LB	21868	12034
BTU / GAL.	66890	72131
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1310.2	5205.2
Specific Gravity as a Vapor @ 14.696	0.7850	1.9341

Heavy End Grouping Breakdown

HEXANES	C6	0.733
HEPTANES	C7	0.486
OCTANES	C8	0.343
NONANES	C9	0.117
DECANES+	C10	0.018
Total		1.697 Mol%

BTEX BREAKDOWN

	Mol%	WT. %
BENZENE	0.034	0.117
TOLUENE	0.132	0.535
ETHYLBENZENE	0.006	0.028
XYLENES	0.065	0.304
Total BTEX	0.237	0.984

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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LABORATORY REFERENCE NUMBER : 6894-250891

Conoco Phillips

ID: **Laird B1**
 AREA: **Eagleford**
 METER: **High Pressure Separator**
 LEASE:
 OPERATOR:
 STATION:
 SAMPLE DATE: **12/20/2011**
 SAMPLE OF: **Gas**

LINE PRESSURE: **1060 PSI**
 LINE TEMPERATURE: **112 F**
 CYLINDER NUMBER: **0110**
 EFFECTIVE DATE:
 SAMPLED BY: **Robert Hester**
 ANALYZED BY: **Kerry Quave**
 ANALYZED DATE: **12/24/2011**
 SAMPLE TYPE: **Spot**

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Physical Properties per GPA 2145-09

Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	<u>MOL%</u>	<u>WEIGHT%</u>	<u>GPM @ 14.696</u>
NITROGEN	0.164	0.202	
CARBON DIOXIDE	2.163	4.187	
METHANE	75.685	53.403	
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
HEXANE	0.733	2.778	0.302
HEPTANE	0.486	1.967	0.194
OCTANE	0.343	1.527	0.141
NONANE	0.117	0.584	0.051
DECANE+	0.018	0.104	0.010
	<u>100.000</u>	<u>100.000</u>	<u>6.428</u>

BTU

	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1310.2	1315.3
BTU @ 14.696 PSIA (SAT.)	1287.3	1292.9
Specific Gravity	0.7850	0.7878
Compressibility (Z)	0.9961	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	6.032
Propane & Heavier	2.881
Butane & Heavier	1.587
Pentane & Heavier	0.767
Total 26 psi Reid V.P. Gasoline GPM	1.791

Secondary BTU Psia Base

	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1339.5	1344.8
BTU @ 15.025 PSIA (SAT.)	1316.1	1321.9

Compressibility (Z) at 15.025 = 0.9960

Remarks:

Precision parameters apply to the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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FIGURE 6-1

H2S METER READING AT SITE

**Burlington Resources Oil & Gas Company LP
Standard Permit Registration
Sugarkane CTB - Baker Dehy Unit
TITAN Project No. 84800507-78
February 2013**

*from USGS Quadrangle Pawnee, Texas
Ground Condition Depicted October 2011
Digital Data Courtesy of ESRI Online Datasets*



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